

BULLETIN OF MISCELLANEOUS INFORMATION No. 10 1938 ROYAL BOTANIC GARDENS, KEW

LIX—THE SIAMESE VERBENACEAE. H. R. FLETCHER.

HISTORICAL.

Our knowledge of the *Verbenaceae* of Siam dates from the publication of Dr. F. N. Williams' paper, "Liste des plantes connues du Siam," in Bull. Herb. Boiss. sér. 2, 4 and 5 (1904-1905). This list includes 26 species of *Verbenaceae*.^{*} In 1905, C. H. Ostenfeld in Bull. Herb. Boiss. sér. 2, 5, 709-724, published a list of the plants collected by E. Lindhard in the Raheng district in the Circle of Nakawn Sawan (see map, p. 403). This short list, however, contains only one species of *Verbenaceae*—*Congea tomentosa*. In the same year, Dr. C. C. Hosseus visited Siam and made collections of plants, chiefly in the north-west, and a fairly complete set of his plants is in the Kew Herbarium. Until 1912 he published a series of papers and one of them, "Die Botanischen Ergebnisse meiner Expedition nach Siam," in Beih. Bot. Centralbl. 28, 2, 357-457 (1911), contains 7 species of *Verbenaceae*, including a doubtful one. This, however, is only a list of the plants collected by himself. During this time, from 1900, the various parts of J. Schmidt's "Flora of Koh Chang" were appearing in the Bot. Tidsskr. of Copenhagen, and part 8 (1904) contained 19 species of *Verbenaceae* from that area.

Finally, in 1911, Prof. Craib (in Kew Bull. 1911, 7-60 and 385-475) gave additions to Williams' list, additions accounted for chiefly by the collections of Dr. Kerr; and, in 1912, all the plants received at Kew up to the end of 1911 formed the subject of his "Contributions to the Flora of Siam (Dicots.)," in Aberdeen University Studies, No. 57. This is really a reprint of his 1911 paper with still further additions.

At this time there were 15 genera and 31 species of *Verbenaceae* known from Siam. These were as follows: *Lantana* (2 spp.); *Stachytarpheta* (1); *Duranta* (1); *Callicarpa* (2); *Tectona* (1); *Premna* (4); *Gmelina* (2); *Vitex* (5); *Clerodendrum* (5, including a doubtful one); *Glossocarya* (1); *Hymenopyramis* (2); *Symphorema* (1); *Sphenodesme* (2); *Congea* (1); *Avicennia* (1).

It should be noted that Prof. Craib omits Schmidt's Kaw Chang collections and that the area taken up does not include Siamese Malay Peninsula. This area is accounted for by Ridley, who in 1911, in Journ. Str. Br. Roy. As. Soc. no. 59, 27-234, published his paper, "A Botanical Expedition to Lower Siam." The ground he covers

^{*} No note is taken of varieties.

is approximately from Prachuap south to the Malay Peninsula, an area lying between latitudes 12° and 6°. He deals with 11 genera and 27 species of *Verbenaceae*.

GEOGRAPHICAL REMARKS.

The geographical area considered in this paper is that enclosed by the political boundaries of Siam, together with that part of the Langkawi Islands group which lies south of the boundary (see map, p. 403). Although politically the latter are included in the Malay Peninsula and are so treated by King and Gamble in the "Materials for a Flora of the Malay Peninsula," yet floristically they are similar to the Islands north of the boundary and it is for this reason that they have been included here within the boundary of Siam.

Siam lies between the parallels of 5° and 2° north latitude and between the meridians of 97° and 106° east longitude and can conveniently be divided into four parts, Northern, Central, Eastern, and Southern or Peninsular Siam. On the north, Siam is bounded by Burma and the French Lao States, on the west by Burma, on the east by the French Lao States and French Cambodia, being separated from the latter by the Me-Kong River except in the extreme north where the frontier lies on the west side of the river. Peninsular Siam is flanked on the west partly by Burma and partly by the Indian Ocean, on the east by the South China Sea and the Gulf of Siam and on the south by the Malay Peninsula. The area included is approximately 200,000 square miles.

Topographically Siam is interesting from three points of view. Firstly, the presence of wide plains is very marked; plains with great alluvial deposits like the Menam plain in the centre of Siam; plains in the Peninsula and the north with only thin deposits; and plains without deposits such as the Eastern Korat Plateau. Secondly mountain ranges are very noticeable, stretching from north to south in North, West and South Siam, and from east to west in South-East Siam in Chantaburi and Prachinburi. Eastern Siam on the other hand is devoid of such ranges. These mountain ranges ascend from the plains very steeply and sometimes, as in Northern Siam, there is a narrow zone of low foothills between the plains and the mountain slopes. In all probability these mountain ranges have a granite core. There are granite exposures in the hills of Prachuap, in the hills between Tavoy and Kanburi, in the Peninsula near Trang and Songkla, and in the south in Kao Sabap, a mountain to the east of Chantabun. Limestone outcrops occur intermittently from the Malay Peninsula, north to Chiengrai. These limestone outcrops form isolated sharp peaks, the highest of which is Doi Chiengdao, over 2100 m. high. South-east of Pitsanulok and west of Krabi, Permo-Carboniferous fossils are to be found in the limestone. Sandstone beds form the caps of some of the mountains south of Loi, those around Kanburi, and the mountain Kao Luang to the west of Sukotai. The Korat and the Nakawn Tai Plateaux

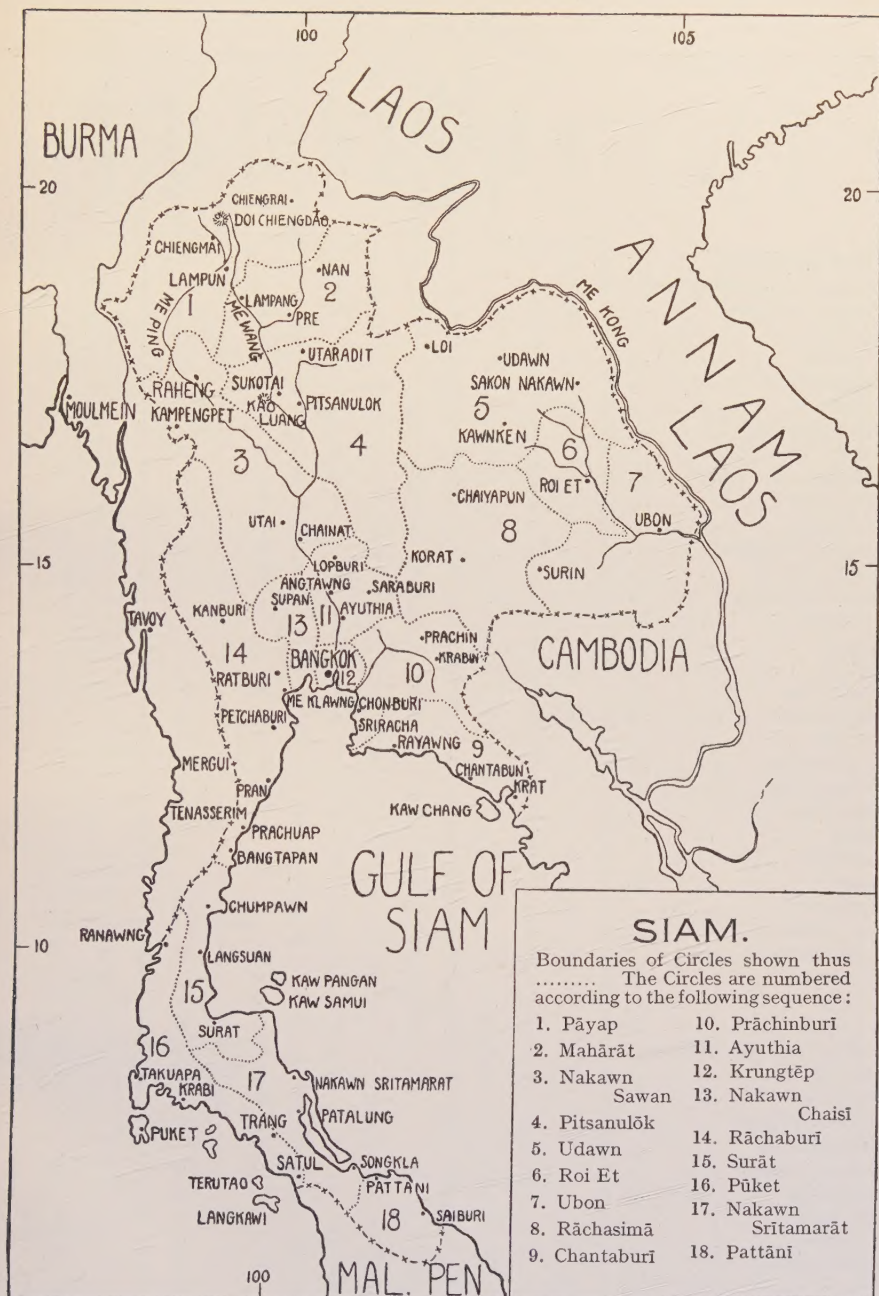


TABLE I.

	India	China (including Hainan)	British Indo- China (Burma & Assam)	French Indo-China	Malay Peninsula	Malay Archipelago	Philippines	Australia
<i>Lantana salviifolia</i> ...	×		×	×				
<i>Stachytarpheta jamaicensis</i>	×		×	×			×	
<i>Callicarpa arborea</i> ...	×	×	×	×	×	×		
<i>C. Maingayi</i> ...					×	×	×	
<i>C. Poilanei</i> ...				×				
<i>C. angustifolia</i> ...					×			
<i>C. lanata</i> ...	×		×		×	×	×	
<i>C. macrophylla</i> ...	×	×	×	×				
<i>C. cana</i> ...		×		×	×	×		×
<i>C. rubella</i> ...	×	×	×	×		×		
<i>C. longifolia</i> ...			×	×	×	×		×
<i>C. psilocalyx</i> ...			×					
<i>Geunsia pentandra</i> ...					×	×	×	
<i>Tectona grandis</i> ...	×		×	×	×	×		
<i>Premna racemosa</i> ...		×	×					
<i>P. scandens</i> ...	×	×	×	×				
<i>P. dubia</i> ...				×				
<i>P. villosa</i> ...	×	×						
<i>P. cordifolia</i> ...			×	×	×			
<i>P. corymbosa</i> ...	×	×	×	×	×	×	×	×
<i>P. foetida</i> ...						×		
<i>P. trichostoma</i> ...					×	×		
<i>P. pyramidata</i> ...			×		×	×		
<i>P. flavescens</i> ...			×	×	×	×		
<i>P. fulva</i> ...				×				
<i>P. latifolia</i> ...	×		×	×			×	
<i>P. nana</i> ...			×					
<i>P. herbacea</i> ...	×	×	×	×				
<i>P. amplexans</i> ...			×					
<i>Gmelina arborea</i> ...	×	×	×	×		×	×	
<i>G. Hystrix</i> ...			×	×	×		×	
<i>G. villosa</i> ...			×	×	×	×	×	
<i>G. asiatica</i> ...	×		×	×	×	×		
<i>Clerodendrum neriifolium</i> ...		×	×	×	×	×		×
<i>C. inermis</i> ...	×		×	×	×	×		
<i>C. deflexum</i> ...					×	×		
<i>C. disparifolium</i> ...					×	×		
<i>C. lankawiense</i> ...					×			
<i>C. penduliflorum</i> ...			×		×	×		
<i>C. umbratile</i> ...					×	×		
<i>C. venosum</i> ...			×					
<i>C. serratum</i> ...	×		×	×	×	×		
<i>C. paniculatum</i> ...		×	×	×	×	×		

TABLE I—continued.

		India	China (including Hainan)	British Indo- China (Burma & Assam)	French Indo-China	Malay Peninsula	Malay Archipelago	Philippines	Australia
<i>C. villosum</i> ...	...			×	×	×	×	
<i>C. infortunatum</i> ...	...	×		×	×	×	×	
<i>C. Garrettianum</i> ...	...				×			
<i>C. Schmidtii</i> ...	...				×			
<i>C. glandulosum</i> ...	...			×	×	×	×	
<i>C. lasiocephalum</i> ...	...			×				
<i>C. fragrans</i> ...	...	×	×	×	×	×	×	×
<i>C. indicum</i> ...	...	×	×	×	×	×	×	
<i>Vitex trifolia</i> ...	...	×	×	×	×	×	×	×
<i>V. Negundo</i> ...	...	×	×		×	×	×	×
<i>V. limoniifolia</i> ...	...			×	×			
<i>V. Pierrei</i> ...	...				×			
<i>V. canescens</i> ...	...		×	×	×			
<i>V. coriacea</i> ...	...			×		×	×	
<i>V. quinata</i> ...	...		×	×	×			
<i>V. heterophylla</i> ...	...		×	×		×	×	×
<i>V. pubescens</i> ...	...	×		×	×	×	×	
<i>V. siamica</i> ...	...							
<i>V. glabrata</i> ...	...			×	×	×	×		×
<i>V. peduncularis</i> ...	...			×	×			
<i>V. longiseepala</i> ...	...					×		
<i>V. vestita</i> ...	...			×	×	×	×	
<i>V. gamosepala</i> ...	...					×	×	
<i>Caryopteris paniculata</i> ...	...		×	×				
<i>Glossocarya mollis</i>...	...			×	×			
<i>G. premnoides</i> ...	...					×		
<i>G. siamensis</i> ...	...				×			
<i>Hymenopyramis brachiata</i>	...	×		×	×				
<i>H. cana</i> ...	...				×			
<i>H. siamensis</i> ...	...				×			
<i>Congea villosa</i> ...	...			×				
<i>C. tomentosa</i> ...	...			×	×	×		
<i>Symphorema involucratum</i>	...	×		×					
<i>Sphenodesme involucrata</i> ...	...		×	×	×			
<i>S. microstylis</i> ...	...			×	×	×		
<i>S. triflora</i> ...	...					×	×	
<i>S. mekongensis</i> ...	...				×			
<i>S. pentandra</i> ...	...		×	×	×	×	×	
<i>Avicennia alba</i> ...	...	×		×	×	×	×		×
<i>A. sphaerocarpa</i> ...	...		×			×		×
<i>A. officinalis</i> ...	...	×		×	×	×	×	
Total ...	...	26	23	56	36	48	42	14	6

are also flanked by such beds. Thirdly there are the remnants of plains on flat mountainous country on the higher levels of the land, as in North, North-Eastern and North-Western Siam.

PHYTOGEOGRAPHICAL REMARKS.

There are 22 genera of *Verbenaceae* in Siam. Apart from the two monotypic genera, *Paravitex* and *Garrettia*, *Lantana*, *Lippia*, *Verben*a, *Duranta*, *Stachytarpheta* and *Petraea* are represented by one or at most two species which are either introduced tropical American plants or plants which are more or less cosmopolitan in tropical, subtropical or even temperate regions. *Geunsia* is a small genus confined to Malaya. *Tectona*, *Congea*, *Symphorema*, *Sphenodesme* and *Glossocarya* are Indo-Malayan genera, though *Glossocarya* has a representative in Australia. *Hymenopyramis* is essentially Indian and Indo-Chinese in its distribution. On the other hand *Callicarpa*, *Premna*, *Gmelina*, *Clerodendrum*, *Vitex*, *Caryopteris* and *Avicennia* have a much wider distribution which extends through the warmer regions of the old and sometimes of the new world.

On the whole the members of the family are excellently equipped for distribution. No doubt many are distributed by birds. For example the blue succulent fruits and persistent coloured calyces of many *Clerodendra*, the white pulpy fruits of *Callicarpa longifolia* and the coloured involucre bracts of *Congea* and *Sphenodesme* are probably adaptations for bird dispersal. Wind dispersal also plays a part, as witness the winged seeds of *Glossocarya*, the balloon-like utricle of *Hymenopyramis*, and in this case also the involucre bracts of *Sphenodesme* and *Congea*. Ocean currents too are important as seed distributors and the fruits of *Clerodendrum inerme*, *Clerodendrum neriifolium*, *Premna corymbosa*, and *Premna obtusifolia* are able to float for many hours because of the air filling one or sometimes more of the loculi of the fruit which are normally occupied by seeds. Also the distribution by ocean currents of the viviparous seedlings of *Avicennia* is well known. At the same time, some of the genera which are so excellently equipped for distribution contain the highest number of endemics, as for example *Hymenopyramis* and *Glossocarya* each with two out of five species and *Congea* with two out of four species endemic.

The distribution of the Siamese *Verbenaceae* in the neighbouring regions of India, China (including Hainan), British Indo-China (the term being used to include Burma and Assam), French Indo-China, Malay Peninsula, Malay Archipelago and the Philippines, is shown in Table I. When a species has a very wide distribution and extends to Australia—a coastal plant like *Clerodendrum neriifolium* for example—the fact is stated. No note is taken either of tropical American plants which have been imported and then quickly spread, or of varieties. In general it can be seen that there exists a close geographical affinity between the Siamese *Verbenaceae* and those of British Indo-China, Malay and French Indo-China, and

a less close affinity with those of India, China, and the Philippines. The table also shows that certain species are found in one region only outside Siam. Of these ten are found only in French Indo-China—*Callicarpa Poilanei*, *Premna dubia*, *Premna fulva*, *Clerodendrum Garrettianum*, *Clerodendrum Schmidtii*, *Vitex Pierrei*, *Glossocarya siamensis*, *Hymenopyramis cana*, *Hymenopyramis siamensis* and *Sphenodesme mekongensis*; six are found only in British Indo-China—*Callicarpa psilocalyx*, *Premna nana*, *Premna amplexens*, *Clerodendrum venosum*, *Clerodendrum lasiocephalum* and *Congea villosa*; and five are found only in the Malay Peninsula—*Callicarpa angustifolia*, *Clerodendrum lankawiense*, *Vitex siamica*, *Vitex longisepala* and *Glossocarya premnoides*.

TABLE II.
DISTRIBUTION IN SIAM OF THE MALAY PENINSULA SPECIES NOT
RECORDED IN BRITISH INDO-CHINA.

Species found in Malay Peninsula and not in British Indo-China.	Distribution in Siam.	North or South of line represented by Latitude 14°.
<i>Callicarpa Maingayi</i> ...	Surat, Puket, Nakawn Sritamarat.	S.
<i>Callicarpa angustifolia</i> ...	Puket	S.
<i>Callicarpa cana</i>	Payap, Nakawn Sawan, Prachinburi, Krungtep, Chantaburi, Rachaburi, Surat, Nakawn Sritamarat.	N. & S.
<i>Geunsia pentandra</i> ...	Rachaburi, Puket	S.
<i>Premna trichostoma</i> ...	Puket	S.
<i>Clerodendrum deflexum</i> ...	Pattani	S.
<i>Clerodendrum disparifolium</i>	Payap, Maharat, Prachinburi, Ayuthia, Krungtep, Puket, Pattani.	N. & S.
<i>Clerodendrum Lankawiense</i>	Surat, Puket	S.
<i>Clerodendrum umbratile</i> ...	Surat, Pattani	S.
<i>Vitex Negundo</i>	Nakawn Sawan, Krungtep, Puket, Pattani.	N. & S.
<i>Vitex siamica</i>	Rachaburi, Surat, Puket ...	S.
<i>Vitex longisepala</i>	Pattani	S.
<i>Vitex gamosepala</i>	Pattani	S.
<i>Glossocarya premnoides</i> ...	Rachaburi, Surat	S.
<i>Sphenodesme triflora</i> ...	Puket, Pattani	S.
<i>Avicennia sphaerocarpa</i> ...	Prachinburi, Nakawn Chaisi, Rachaburi, Surat, Puket.	S.

It is interesting to compare briefly, the distribution within Siam of these three floristic elements. For this purpose Siam may conveniently be divided into five regions, the division being based as far as possible on natural features:

1. NORTHERN SIAM—including the circles of Payap, Maharat, Nakawn Sawan, Pitsanulok.

2. EASTERN SIAM—including the circles of Udawn, Roi Et, Ubon, Rachasima.

3. SOUTHERN SIAM—including the circles of Chantaburi, Prachinburi, Ayuthia, Krungtep, Nakawn Chaisi.

4. WESTERN SIAM—including the circle of Rachaburi.

5. PENINSULAR SIAM—including the circles of Surat, Puket, Nakawn Sritamarat, Pattani.

Of the French Indo-Chinese species, seven are to be found in Northern Siam, seven in Southern Siam, four in Eastern Siam, two in Western Siam and none in Peninsular Siam. Thus there are two main areas of concentration of French Indo-Chinese species, Northern and Southern Siam, and two subsidiary areas—Eastern and Western Siam.

Of the British Indo-Chinese species, four are found in Northern Siam, and one each in Southern, Western and Peninsular Siam. Thus British Indo-Chinese species are concentrated in Northern Siam.

The Malay Peninsular species are restricted to Peninsular and Western Siam with all five species in Peninsular and two of the species in Western Siam.

If a species does not occur in British Indo-China and yet occurs in the Malay Peninsula, its distribution in Siam is almost invariably confined to the west, the south, or the Peninsula. Table II shows the distribution in Siam of such species. In general Prachinburi, Krungtep and Nakawn Chaisi would seem to be the northern limit of these Malay Peninsular species which are not found in British Indo-China. There are three exceptions. *Callicarpa cana* and *Vitex Negundo* are found as far north as Payap and Nakawn Sawan respectively, and although not in British Indo-China they are in French Indo-China from whence they probably came to Payap and Nakawn Sawan. *Clerodendrum disparifolium* is a cultivated plant and this may account for its being found as far north as Payap. Apart from these three exceptions it would seem to be possible to draw a line representing the northern limit of Peninsular species. Such a line could be shown by latitude 14°N. The same would apply to Malay Archipelago species which are, with few exceptions, the same as the Peninsula ones.

KEY TO GENERA.

Inflorescence spicate or racemose (Tribe I. *Verbeneae*) :

Inflorescence spicate :

Fertile stamens 4; anther cells parallel :

Spikes short; inflorescence capituliform in flower :

Fruit a drupe with 2 bony pyrenes.....**Lantana**

Fruit dry, separating into two 1-seeded pyrenes.....**Lippia**

Spikes long, inflorescence distinctly spicate at all stages :

Fruit with four 1-seeded pyrenes.....**Verbena**

Fruit with four 2-seeded pyrenes.....**Durant**

Fertile stamens 2 ; anther cells divaricate ; spikes long.....

Stachytarpheta

Inflorescence racemose..... **Petreaea**

Inflorescence cymose :

Cymes paniculate :

Fruit fleshy (Tribe II. *Viticeae*) :

Corolla regular ; stamens isomerous :

Flowers 4-merous ; drupe with 4 pyrenes.....**Callicarpa**

Flowers 4- to 6-merous :

Flowers 5-merous ; calyx not accrescent in fruit ;
drupe with 4-10 pyrenes.....**Geunsia**

Flowers 4- to 6-merous ; calyx accrescent in fruit ;
drupe with 14-celled endocarp.....**Tectona**

Corolla bilabiate ; stamens didynamous :

Anthers opening by a circular pore.....**Premna**

Anthers opening by longitudinal slits :

Fruit with 1 pyrene :

Flowers large, up to 3 cm. long ; calyx usually with
large glands.....**Gmelina**

Flowers small not exceeding 1 cm. in length ; calyx
without large glands :

Pyrene 2-4-celled, 2-4-seeded ; leaves digitate
(except one variety).....**Vitex**

Pyrene 1-celled, 1-seeded (3 rudimentary cells) ;
leaves simple.....**Paravitex**

Fruit with 4 pyrenes.....**Clerodendrum**

Fruit capsular (Tribe III. *Caryopterideae*) :

Cymes axillary :

Calyx deeply 5-fid ; stamens greatly exsert ; leaves always
simple**Caryopteris**

Calyx 5-toothed or almost entire ; stamens slightly exsert ;
leaves often compound...**Garrettia**

Cymes terminal :

Panicle dense, corymbiform ; calyx not accrescent in
fruit **Glossocarya**

Panicle lax, pyramidal ; calyx greatly accrescent in fruit...
Hymenopyramis

Cymes capitate :

Cymes involucrate ; calyx 4- to 6-dentate (Tribe IV.
Symphoremeae) :

Involucral bracts 3-4 ; corolla 2-lipped, 5-lobed.....**Congea**

Involucral bracts 6 :

Corolla 6- to 8-lobed ; leaves usually dentate, **Symphorema**

Corolla 5- to 6-lobed ; leaves entire.....**Sphenodesme**

Cymes not involucrate ; calyx of 5 imbricate sepals (Tribe V.
Avicennieae) **Avicennia**

KEY TO SPECIES AND ENUMERATION.*

TRIBE I. VERBENEAE

Lantana Linn.

Branchlets with prickles ; bracts ovate, about half as long as the corolla tube (1) *L. aculeata*
Branchlets without prickles ; bracts lanceolate, as long as the corolla tube..... (2) *L. salviifolia*

(1) **L. aculeata** Linn. Sp. Pl. 627 (1753) ; Brand. Ind. Trees, 502 ; K. and G. Mat. 796 ; Lam Verb. 12 ; Ridl. F. M. P. 612. *L. camera* Linn. ; C. B. Clarke in F. B. I. 562, *in nota* ; P'ei Verb. 9 ; Dop in F.I.C. 779 ; F.K.C. 171 ; Craib 162. *L. mixta* Linn. ; Kurz For. Fl. 253.

PAYAP. Chiengmai, 300 m., waste ground, *Kerr* 711. PRACHINBURI. Sriracha, c. 5 m., *Mrs. D. J. Collins* 63. KRUNGTEP. Bangkok, *Marcan* 502. *Zimmermann* 33, 170. SURAT. Ban Na, *Yuang* 10. PUKET. Satul, La-Ngu, c. 5 m., common on waste ground, but not a serious pest, *Kerr* 13942. Collected on a journey from Tavoy to Bangkok, common Siamese plant, *Chandler*.

Distribution. Native of Tropical America and now widely spread in many regions of the Old World.

(2) **L. salviifolia** Jacq. Hort. Schoenbr. 3, 18, t. 285 (1798) ; K. and G. Mat. 786 ; Lam Verb. 13. *L. indica* Roxb. ; C. B. Clarke in F.B.I. 562 ; Brand. Ind. Trees 502 ; Craib 162 ; Ridl. F.M.P. 612 ; Dop in F.I.C. 778.

PAYAP. Me Ping, Muang Hat, c. 240 m., *Kerr* 2014.

Distribution. India (*type*), Burma, Ceylon, Cambodia (ex F.I.C.). Tropical and South Africa.

Lippia Linn.

L. nodiflora Rich. in Michx. Fl. Bor. Amer. 2, 15 (1803) ; C. B. Clarke in F.B.I. 563 ; Brand. Ind. Trees 503 ; Williams 430 ; K. and G. Mat. 797 ; Lam Verb. 16 ; Ridl. F.M.P. 612 ; P'ei Verb. 10 ; Dop in F.I.C. 780.

UDAWN. Nakawn Panom, Muk Dahan, c. 200 m., sandbank in river, *Kerr* 21414. KRUNGTEP. Bangkok, tidal, railway embankment, *Kerr* 3702. *Marcan* 477, 1721. *Zimmermann* 163. PUKET. Krabi, Lanta, open grassy ground near sea, *Kerr* 18867. NAKAWN SRITAMARAT. Songkla, Singora, *Annandale* 1682.

Distribution. Tropical America (*type*). Introduced into Tropical Asia.

Verbena Linn.

V. officinalis Linn. Sp. Pl. 20 (1753) ; Schauer in DC. Prodr. 11, 547 ; C. B. Clarke in F.B.I. 565 ; Lam Verb. 10 ; P'ei Verb. 7 ; Dop in F.I.C. 777.

* The abbreviated references cited are given in full in the bibliography at the end of the paper (p. 444). In the enumeration they are cited in chronological order.

PAYAP. Chiengdao, Muang Kawng, c. 1400 m., *Kerr* 5539.
UDAWN. Chaiyaburi, Nawngkai, c. 200 m., sandbank, *Kerr* 20695.

Distribution. Cosmopolitan in tropical, subtropical and temperate regions.

Duranta Jacq.

D. Plumieri Jacq. Select. Am. 186, t. 176, f. 76 (1763); C. B. Clarke in F.B.I. 560 (*in nota*); K. and G. Mat. 795; Craib 163. Lam Verb. 27; Dop in F.I.C. 784.

PAYAP. Chiengmai, Ban Nawng Hoi, c. 300 m., a big armed shrub cultivated as a hedge plant, *Winit* 252. KRUNGTEP. Bangkok, *Zimmerman* 11, 133, 159.

Distribution. Native of Trop. America, often cultivated in the tropics.

Stachytarpheta Vahl

S. jamaicensis Vahl Enum. 1, 206 (1805); K. and G. Mat. 798; Ridl. i. 155; Lam Verb. 22; Ridl. F.M.P. 613; P'ei Verb. 11; Dop in F.I.C. 783. *S. indica* Vahl; C. B. Clarke in F.B.I. 564; F.K.C. 171; Williams 430.

NAKAWN SAWAN. Raheng, Ban Tak, c. 120 m., waste ground, *Kerr* 2171. KRUNGTEP. Bangkok, c. 20 m., *Smith* 211. SURAT. Chumpawn, Bang Son, c. 20 m., common in scrub and savannah, *Kerr* 11345. PUKET. Trang, Kao Kao, railroad, *Rabil* 381. Satul, very common (ex *Ridl.*). NAKAWN SRITAMARAT. Songkla, Lam Son, near sea coast, waste ground all over Southern provinces, *Kerr* 15137.

Distribution. Indo-Malaya. Tropical America (*type*—Jamaica).

Petraea Linn.

P. volubilis Linn. Sp. Pl. 626 (1753); Lam Verb. 26.

MAHARAT. Lampang, c. 240 m., cultivated, *Winit* 1602. KRUNGTEP. Bangkok, cultivated, *Kerr*.

Distribution. Native of Trop. America, and introduced into Malaya.

TRIBE II. VITICEAE

Callicarpa Linn.

Glands on the lower surface of the leaf hidden by the dense tomentum:

Tomentum soft, closely stellate:

Leaves at least $2\frac{1}{2}$ times as long as broad, taperingly acuminate at the apex, long-acute or cuneate at the base.....

(1) *C. arborea*

Leaves generally $1\frac{1}{2}$ times, at most twice as long as broad, caudate acuminate at the apex, almost round and then slightly decurrent at the base.....(2) *C. arborea* var. *villosa*

Tomentum minute, adpressed:

Leaves elliptic to obovate, obtuse or very shortly acuminate at the apex; corolla with a close grey stellate tomentum without(3) *C. Maingayi*

Leaves elliptic to oblong-elliptic, long acuminate :

Leaves shortly tapering at the base ; cymes many-flowered...

(4) *C. Poilanei*

Leaves narrowly round or cuneate at the base ; cymes few-flowered.....(5) *C. angustifolia*

Glands on the lower surface of the leaf not hidden by the dense tomentum which is sometimes absent :

Leaves at most twice as long as broad :

Midrib glabrous above, leaf dark tawny below, leaf base rounded or at most only slightly tapering, margin entire or occasionally very slightly toothed.....(6) *C. lanata*

Midrib covered with stellate hairs above, leaf base tapering into the petiole, leaf light-grey below, margin serrate.....

(7) *C. cana*

Leaves at least twice as long as broad :

Leaves stellately tomentose below :

Leaves cuneate at the base, petiole 15-25 mm. long.....

(8) *C. macrophylla*

Leaves deltoid or cordate at the base, petiole at most 5 mm. long.....(9) *C. rubella*

Leaves sparsely stellately hairy or almost glabrous below :

Leaves with numerous red glands above and below.....

(10) *C. glandulosa*

Leaves with numerous yellow glands above and below :

Ovary tufted with white hairs at the tip :

Leaves very thinly stellately hairy below.....

(11) *C. longifolia*

Leaves glabrous below, except the midrib and the lateral nerves.....(12) *C. longifolia* var. *lanceolaria*

Ovary glabrous ; leaves glabrous below except for stellate hairs on the midrib and the lateral nerves.....

(13) *C. psilocalyx*

(1) *C. arborea* Roxb. Hort. Beng. 10 (1814), and Fl. Ind. 1, 390 (1832) ; Kurz For. Fl. 274 ; C. B. Clarke in F.B.I. 567 ; Brand. Ind. Trees 511 ; K. and G. Mat. 803 ; Craib 163 ; Ridl. iv. 110 ; Ridl. F.M.P. 614 ; P'ei Verb. 21 ; Dop in F.I.C. 792. *C. villosissima* Ridl. iv. 110. *C. tomentosa* Bakh. Verb. 20, non Linn.

PAYAP. Doi Sutep, c. 900 m., deciduous forest, *Kerr* 691. MAHARAT. Pre, Hui Paknai, c. 210 m., *Vanpruk* 321. PRACHIN-BURI. Sriracha, Kao Chalak, c. 12-120 m., *Mrs. D. J. Collins* 1251, 1454. RACHABURI. Kanburi, Hin Dat, *Put* 48. SURAT. Chumpawn, Bang Son, c. 20 m., savannah, *Kerr* 11326. Tasan, *Kloss* 6851 (type of *C. villosissima* Ridley). Surat, Kantuli, *Put* 4112. PUKET. Ranawng, Lam Lieng, c. 10 m., scrub, *Kerr* 16419. Puket, Khaw Pok Hill, c. 300 m., *Haniff et Nur* 3824. Trang, Bangram, 100 m., *Vanpruk* 745. Satul, Tung Wa, c. 10 m., savannah, *Kerr* 13887. PATTANI. Pattani, Banang Sta, c. 50 m., savannah, *Kerr* 7887. SIAM. *Kerr* 182.

Distrib. India, British Indo-China (*type*—Chittagong), Yunnan, French Indo-China, Malaya.

(2) **C. arborea** Roxb. var. **villosa** (Roxb.) King et Gamble Mat. 803 (1909); Ridl. F.M.P. 614, *in nota*. *C. villosa* Roxb. Hort. Beng. 10 (1814). *C. lanata* Lam Verb. 79, *pro parte, non* Linn.

PAYAP. Doi Saket, North Plateau, c. 1000 m., *Hosseus* 618. PATTANI. Pattani, Tomo, Ban Kaung, c. 90 m., *Lakshnakara* 838.

Distrib. Malay Peninsula, Sylhet (*type*).

(3) **C. Maingayi** King et Gamble in Kew Bull. 106 (1908) and Mat. 804; Lam Verb. 63; Ridl. F.M.P. 615. *C. tomentosa* Murr. var. *typica* Bakh. Verb. 21 (1921).

SURAT. Surat, Ban Kawp, c. 100 m., evergreen forest on limestone hill, *Kerr* 13363. PUKET. Puket, Talang, c. 50 m., evergreen forest by stream, *Kerr* 17438. Trang, Chawng, c. 100 m., evergreen forest, *Kerr* 15191. NAKAWN SRITAMARAT. Tung Song, Ao Wang Kram, valley, *Rabil* 208.

Distrib. Malay Peninsula (*type*—Malacca), Sumatra, Philippines (ex *Bakhuizen*).

(4) **C. Poilanei** Dop in Trav. Lab. forestier Toulouse, 1, art. 21, p. 6 (1932); F.I.C. 790.

CHANTABURI. Chantabun, Kao Sabap, *Put* 901. PRACHINBURI. Krabin, Ban Keng, c. 25 m., evergreen forest, *Kerr* 19788.

Distrib. French Indo-China (*type*) (ex *F.I.C.*).

(5) **C. angustifolia** King et Gamble in Kew Bull. 106 (1908) and Mat. 804; Ridl. i. 155; Ridl. F.M.P. 615.

PUKET. Krabi, Ao Luk, c. 50 m., scrub on limestone rock, *Kerr* 18578. Langkawi, *Wilkinson* 20778. *Henderson* 29152. *Ridley* 8330.

Distrib. Malay Peninsula (*type*).

(6) **C. lanata** Linn. Mant. 1, 331 (1771); C. B. Clarke in F.B.I. 567; Brand. Ind. Trees 512; Hoss. 429; Lam Verb. 79, *pro parte*. *C. tomentosa* Murr. var. *lanata* (Linn.) Bakh. Verb. 21 (1921).

MAHARAT. Nan, Nam Mut, c. 300 m., *Winit* 1773. Lampang, Me Peng, 150 m., evergreen forest, *Winit* 1701.

Distrib. India (*type*—Ceylon), Burma, Malay Archipelago, Philippines (ex *Lam*).

(7) **C. cana** Linn. Mant. 1, 198 (1771); C. B. Clarke in F.B.I. 568; F.K.C. 171; Williams 430; K. and G. Mat. 806; Ridl. i. 155; Craib 163; Lam Verb. 68; Ridl. F.M.P. 616; P'ei Verb. 25; Dop in F.I.C. 793. *C. cana* Linn., var. *typica* Bakh. Verb. 20 (1921).

PAYAP. Chiangmai, c. 300 m., scrub jungle, *Kerr* 1226. NAKAWN SAWAN. Chainat, *Put* 2645. CHANTABURI. Kaw Chang, Lem Ngawp, *Schmidt* 5. PRACHINBURI. Sriracha, c. 5 m., roadside shrub, *Mrs. D. J. Collins* 1252. KRUNGTEP. Bangkok, below 5 m., growing in temple grounds but said to be spontaneous, *Kerr* 4287.

RACHABURI. Kanburi, Hin Dat, *Put* 116. PRAN, 5 m., *Marcan* 630. *Ladell* 274. SURAT. Kaw Samui, Ban Bua Put, under 5 m., scrub, *Kerr* 15712. Surat, Kantuli, *Put* 4201. PUKET. Trang, Chawng, c. 120–240 m., *Mrs. D. J. Collins* 2400. NAKAWN SRITAMARAT. Tung Song, Kao Namhom Keo, *Rabil* 236. SIAM. 398. *Kerr* 4287. *Distrib.* India, French Indo-China, Malaya (*type*—Java), Hainan, N. Australia.

(8) *C. macrophylla* *Vahl* Symb. 3, 13, t. 53 (1794); Kurz For. Fl. 274; C. B. Clarke in F.B.I. 568; Brand. Ind. Trees 512; Bakh. Verb. 25; P'ei Verb. 23; Dop in F.I.C. 795.

PAYAP. Chiengrai, 460 m., gregarious in waste places about villages, *Winit* 1152.

Distrib. N. India (*type*), China, British Indo-China, Tonkin, Annam (ex F.I.C.), N. Guinea, Mascarenes, Reunion.

(9) *C. rubella* *Lindl.* Bot. Reg. t. 883 (1825); Kurz For. Fl. 274; C. B. Clarke in F.B.I. 569; Brand. Ind. Trees 512; Lam Verb. 53; P'ei Verb. 38; Dop in F.I.C. 796. *C. cuspidata* Roxb.; Bakh. Verb. 23, *pro parte, quoad syn. C. rubella*.

PAYAP. Chiengdao, Muang Kawng, c. 1400 m., *Kerr* 5541. Doi Angka, Doi Pa Mawn, c. 1320 m., *Garrett* 1028. PITSANULOK. Sukotai, Kao Luang, c. 1000 m., evergreen forest, *Kerr* 5934. CHANTABURI. Krat, Kao Kuap, *Put* 3028. PUKET. Krabi, Panom Bencha, c. 1300 m., *Kerr* 19384.

Distrib. E. Himalaya, China (*type*), Indo-China, Malay Archipelago (ex *Lam*).

(10) *C. glandulosa* *Fletcher* in Kew Bull. 199 (1938).

SURAT. Chumpawn, Ta Ngaw, c. 50 m., by stream in evergreen forest, *Kerr* 11469 (*type*).

(11) *C. longifolia* *Lamk.* Dict. 1, 563 (1785) and Ill. t. 69; Kurz For. Fl. 275; C. B. Clarke in F.B.I. 570; Brand. Ind. Trees 512; F.K.C. 171; Williams, 430; K. and G. Mat. 807; Ridl. i. 155; Ridl. iii. 165; Lam Verb. 86; Bakh. Verb. 26; Ridl. F.M.P. 616; P'ei Verb. 30; Dop in F.I.C. 802.

CHANTABURI. Kaw Chang, *Schmidt* 861. PUKET. Satul, *Lakshnakara* 326. Langkawi, *Curtis* 2134. RACHABURI. Bangtapan, *Keith* (ex *Ridl.*). NAKAWN SRITAMARAT. Songkla, Lem Son, scrub near sea, *Kerr* 15123. Kaw Lem Soon, *Annandale*. Nakawn, Kuan Mai Deng, c. 100 m., *Vanpruk*, 712. Rawnpibun, *Hill* 470. PATTANI. Pattani, Tomo, Bukit Nasi, c. 90 m., *Lakshnakara* 326. Naratiwat, Sungai Padi, *Bourke*.

Distrib. Indo-China, Malaya (*type*—Malacca), N. Australia.

(12) *C. longifolia* *Lamk.* var. *lanceolaria* C. B. Clarke in F.B.I. 570 (1885). *C. longifolia* *Lamk.* var. *subglabrata* Schauer; Lam Verb. 87 (1919); Bakh. Verb. 26.

MAHARAT. Lampang, Me Salop, secondary growth forest, *Winit* 1465. CHANTABURI. Chantabun, Kao Sabap, *Put* 924.

Kaw Chang, near sea level, *Vanpruk* 962. *Vanpruk* 5568. Kaw Chang, c. 50 m., stream side, *Marcan* 1250. SURAT. Langsuan, Ban Kraye, c. 50 m., scrub, *Kerr* 12114.

Distrib. British Indo-China (*type*—Sylhet), Malay Archipelago (ex *Bakhuizen*).

(13) **C. psilocalyx** C. B. Clarke in F.B.I. 569 (1885) ; Brand. Ind. Trees 512. *C. cuspidata* Roxb. ; Bakh. Verb. 23, *pro parte, quoad syn. C. psilocalyx*.

PRACHINBURI. Sriracha, Hup Bon, c. 60 m., Mrs. D. J. Collins 1667. Ban Dan, evergreen forest, *Marcan* 149.

Distrib. Burma (*type*).

Geunsia Blume.

G. pentandra (Roxb.) Merrill in Phil. Journ. Sc. Bot. 11, 309 (1916). *G. farinosa* Blume ; C. B. Clarke in F.B.I. 566 (1885) ; K. and G. Mat. 801 ; Ridl. i. 155 ; Ridl. F.M.P. 614. *G. farinosa* var. *typica* forma *farinosa* (Blume) Bakh. Verb. 13 (1921).

RACHABURI. Bangtapan, *Keith* (ex *Ridl.*). PUKET. Langkawi, *Curtis* 2532.

Distrib. Malaya, Philippines.

Tectona Linn. f.

T. grandis Linn. f. Suppl. 151 (1781) ; Kurz For. Fl. 259 ; C. B. Clarke in F.B.I. 570 ; Brand. Ind. Trees 505 ; F.K.C. viii. 172 ; Williams 430 ; K. and G. Mat. 809 ; Craib 163 ; Lam Verb. 95 ; Ridl. F.M.P. ii. 607, *in nota* ; Dop in F.I.C. 804.

PAYAP. Chiangmai 24. Doi Sutep, c. 330 m., mixed forest, *Kerr* 1297. KRUNGTEP. Bangkok, *Marcan* 957.

Distrib. India (*type*), Burma, French Indo-China, Malaya.

Premna Linn.

Calyx 2-lipped ; lips entire or upper lip 2-toothed, lower lip subentire :

Lips entire :

Cymes condensed, forming an interrupted spike-like panicle...

(1) *P. racemosa*

Cymes forming a compound corymb :

Leaves firmly chartaceous, strongly pubescent along the petiole groove.....(2) *P. coriacea* var. *oblonga*

Leaves membranous, glabrous or faintly pubescent along the petiole groove.....(3) *P. scandens*

Upper lip distinctly 2-toothed, lower lip subentire :

Calyx markedly pubescent within.....(4) *P. dubia*

Calyx glabrous or at most only faintly pubescent within :

Leaves elliptic to obovate, mucronate.....(5) *P. Garrettii*

Leaves ovate to elliptic or oblong :

Leaves villous beneath, ovate to elliptic.....(6) *P. villosa*

Leaves glabrous beneath, except for local hairs :

- Leaves generally cordate at the base :
- Leaves ovate to oblong-elliptic, taperingly acuminate at the apex.....(7) *P. cordifolia*
- Leaves almost orbicular, broadly obtuse at the apex...
(11) *P. corymbosa* var. *obtusifolia*
- Leaves often round, but never cordate at the base :
- Corymbs up to 18 cm. broad :
- Leaf margin generally repand above.....(8) *P. foetida*
- Leaf margin entire :
- Leaves obovate or orbicular.....(9) *P. trichostoma*
- Leaves oblong-ovate.....(10) *P. corymbosa*
- Corymbs up to 3 cm. broad :
- Leaves at least 3 cm. long, with a line of hairs along either side of the basal half of the midrib below.....(12) *P. corymbosa* var. *angustior*
- Leaves at most 2 cm. long, glabrous below except for a few pubescent hairs on the midrib.....
(13) *P. corymbosa* var. *minor*
- Calyx 2-lipped, sometimes obtusely so, of 5-4 teeth :
- Calyx of 5 teeth, lower lip 2-toothed, upper lip 3-toothed :
- Plants with stellate hairs.....(14) *P. pyramidata*
- Plants with simple hairs :
- Corymbs rather lax :
- Leaves setulose above, the hairs more numerous on the nerves :
- Leaves strongly or faintly pubescent below, the hairs very short and adpressed.....(15) *P. Collinsae*
- Leaves villous below, sometimes pubescent, but then the hairs longer than in *P. Collinsae*, curly and slightly spreading :
- Leaves villous below, and with numerous short hairs on the nerves above.....(16) *P. flavescens*
- Leaves pubescent below, with larger, more tawny hairs on the nerves above :
- Hairs on the lower surface short, leaf margin irregularly toothed.....
(17) *P. flavescens* var. *glabrior*
- Hairs on the lower surface longer and more spreading, dark tawny, margin always toothed
(18) *P. fulva*
- Leaves minutely tomentose or glabrous except for a faint pubescence on the midrib above and below :
- Leaf base shallowly cordate, round or slightly cuneate...
(19) *P. latifolia*
- Leaf base always cuneate :
- Leaves minutely tomentose beneath.....
(20) *P. latifolia* var. *cuneata*
- Leaves minutely pubescent on the midrib above and below.....(21) *P. latifolia* var. *mucronata*

Corymbs smaller and more compact :

Leaves very hairy on both surfaces.....(22) *P. nana*

Leaves glabrous or minutely pubescent on both surfaces :

Leaves ovate, cordate, lower surface conspicuously glandular(23) *P. serrata*

Leaves ovate to elliptic to oblong to obovate :

Leaves sharply serrate, narrowly round at the base...

(24) *P. amplexans*

Leaves mostly entire, occasionally with a few teeth towards the apex, or lobed :

Leaves entire :

Branchlets glabrous at the nodes :

Leaves elliptic to obovate to oblong-elliptic...

(25) *P. herbacea*

Leaves ovate to elliptic.....(26) *P. paniculata*

Branchlets with a ring of hairs at the nodes.....

(27) *P. annulata*

Leaves lobed.....(28) *P. repens*

Calyx with 4 teeth, upper and lower lips each of 2 teeth :

Leaves thickly tomentose beneath, cordate...(29) *P. siamensis*

Leaves glabrous beneath except for axillary tufts and short hairs on either side of the midrib at the base, round at the base

(30) *P. quadridentata*

(1) **P. racemosa** Wall. ex Schauer in DC. Prodr. 11, 633 (1847) ; Kurz For. Fl. 263 ; C. B. Clarke in F.B.I. 571 ; Brand. Ind. Trees 509.

PAYAP. Doi Pa Kao, c. 1500 m., common in evergreen forest, Kerr 5379.

Distrib. British Indo-China (type—Sylhet), Yunnan.

(2) **P. coriacea** C. B. Clarke var. **oblonga** C. B. Clarke in F.B.I. 573 (1885).

PAYAP. Chawm Tawng, Me Kang, c. 600 m., on rocks by stream, deciduous forest, Kerr 5353. PITSANULOK. Nakawn Tai, c. 500 m., mixed forest, Kerr 5815. UDAWN. Nawngkai, Chaiyaburi, c. 200 m., deciduous forest, Kerr 21322.

Distrib. N.E. India, British Indo-China (type—Khasia).

(3) **P. scandens** Roxb. Fl. Ind. 3, 82 (1832) ; Kurz For. Fl. 262 ; C. B. Clarke in F.B.I. 573 ; Brand. Ind. Trees 510 ; Dop in F.I.C. 817.

PAYAP. Chawm Tawng, Me Kang, c. 450 m., common on trees along stream, Kerr 5272.

Distrib. N.E. India, British Indo-China (type—Sylhet), Cochinchina (ex F.I.C.), Yunnan.

(4) **P. dubia** Craib in Kew Bull. 283 (1914) ; Dop in F.I.C. 812.

MAHARAT. Lampang, scrub jungle, c. 225 m., Kerr 2562 (type). PRACHINBURI. Sriracha, c. 10 m., Mrs. D. J. Collins 765. RACHABURI. Prachuap, Hui Yang, Put 3228.

Distrib. Laos, Annam (ex F.I.C.).

(5) **P. Garrettii** *Fletcher* in Kew Bull. 200 (1938).

PAYAP. Chiengrai, Doi Tam Tu Pu, summit West Peak, c. 530 m. limestone rock, *Garrett* 296 (*type*).

(6) **P. villosa** *C. B. Clarke* in F.B.I. 573 (1885) ; Brand. Ind. Trees 510

PAYAP. Chiengrai, below Dai Tam Tu Pu, edge of old Me Kok bed, c. 380 m., *Garrett* 224. Chiengrai, c. 430 m., open swampy forest, *Winit* 1160. Doi Suteb, c. 65 m., mixed forest, *Kerr* 3258. MAHARAT. Nan, c. 220 m., lower mixed forest, *Winit* 1779.

Distrib. Deccan Peninsula (*type*—Kurg Mountains), Yunnan.

(7) **P. cordifolia** *Roxb.* Fl. Ind. 3, 78 (1832) ; C. B. Clarke in F.B.I. 572 ; Brand. Ind. Trees 510 ; K. and G. Mat. 818 ; Ridl. i. 156 ; Lam Verb. 111 ; Ridl. F.M.P. 621 ; Dop in F.I.C. 816.

NAKAWN SRITAMARAT. Songkla, Ban Prakawp, c. 50 m., scrub, *Kerr* 15827. PATTANI. Pattani, Banang Sta, c. 100 m., scrub jungle, *Kerr* 7370.

Distrib. Assam, Malay Peninsula (*type*—Penang), French Indo-China (ex *F.I.C.*).

(8) **P. foetida** *Reinw. ex Blume* Bijdr. 816 (1825) ; K. and G. Mat 814 ; Ridl. i. 155 ; Ridl. F.M.P. 619 ; *P. integrifolia* Lam Verb. 140 (1919) *pro parte, non* Linn.

NAKAWN SRITAMARAT. Songkla, Kaw Deng, *Annandale*. Lower Siam, Punjab, *Haniff et Nur* 3987.

Distrib. Java, Borneo.

(9) **P. trichostoma** *Miq.* Fl. Ind. Bat. 2, 892 (1856) ; K. and G. Mat. 816 ; Lam Verb. 128 ; Ridl. F.M.P. 620. *P. parasitica* C. B. Clarke in F.B.I. iv. 574 (1885), *non* Blume ; Brand. Ind. Trees 510 ; Ridl. i. 155 ; Ridl. ii. 58.

PUKET. Langkawi, *Curtis* 2796. Pulau Adang, *Ridley* 15855.

Distrib. Java, Borneo, Malay Peninsula.

(10) **P. corymbosa** (*Burm. f.*) *Rottl. et Willd.* in Ges. Nat. Fr. Neue Schr. 4, 187, 188 (1803) ; C. B. Clarke in F.B.I. 573 ; *P. integrifolia* Linn. Mant. 2, 252 (1771) ; C. B. Clarke in F.B.I. 574 ; Brand. Ind. Trees 510 ; F.K.C. 172 ; Williams 431 ; Craib 164 ; Lam Verb. 140 *pro parte* ; Ridl. F.M.P. 618 ; Dop in F.I.C. 818. *P. serratifolia* Linn. Mant. 2, 253 (1771) ; Kurz For. Fl. 262. *Cornutia corymbosa* *Burm. f.* Fl. Ind. 132, t. 41, f. 1 (1768).

CHANTABURI. Krat, *Put* 502. Kaw Chang, Klawng Mayom, grassy land near stream, *Rabil* 27. Kaw Lom, *Schmidt* 716. Kaw Chang, near sea-level, *Vanpruk* 956. PRACHINBURI. Sriracha, beach, *Kerr* 2099. Mrs. D. J. Collins 249. KRUNGTEP. Bangkok, tidal, river bank, *Kerr* 3681. *Marcan* 985. RACHABURI. Nawng Ke forest, c. 5 m., Mrs. D. J. Collins 1604. Ban Cha Am, c. 2 m., scrub jungle, *Marcan* 1680. PUKET. Satul, Adang, beach, *Kerr* 14076.

Distrib. Tropical Asia (*type*—Ceylon), Australia, Africa.

(11) **P. corymbosa** (Burm. f.) Rottl. et Willd. var. **obtusifolia** (R. Br.) Fletcher in Notes Roy. Bot. Gard. Edinb. **19**, 178 (1936). *P. integrifolia* Linn. var. *obtusifolia* (R. Br.) P'ei Verb. **75** (1932); Dop in F.I.C. 820. *P. integrifolia* Linn.; Lam Verb. **140**, *pro parte*. *P. obtusifolia* R. Br. Prodr. **512** (1827); F.K.C. **172**; Williams **431**.

KRUNGTEP. Bangkok, tidal river bank, *Kerr* 3681. RACHABURI. Nawng Ke forest, c. **5** m., *Mrs. D. J. Collins* 1604.

Distrib. Malay Archipelago, Australia (*type*).

(12) **P. corymbosa** (Burm. f.) Rottl. et. Willd. var. **angustior** (C. B. Clarke) Fletcher in Notes Roy. Bot. Gard. Edinb. **19**, 178 (1936). *P. integrifolia* Linn. var. *angustior* C. B. Clarke in F.B.I. **572** (1885); K. and G. Mat. **813**; Ridl. i. **155**; Dop in F.I.C. **819**. *P. angustior* (C. B. Clarke) Ridl. F.M.P. **619** (1923).

RACHABURI. Prachuap, *Put* 260. PUKET. Langkawi, *Curtis* (ex *Ridl.*).

Distrib. Malay Peninsula (*type*—Malacca).

(13) **P. corymbosa** Linn. var. **minor** (Ridley) Fletcher in Notes Roy. Bot. Gard. Edin. **19**, 178 (1936). *P. integrifolia* Linn. var. *minor* Ridl. F.M.P. **619** (1923).

PUKET. Puket, Lem La, branches prostrate, in sand by sea, *Kerr* 17395.

Distrib. Mergui, Ceylon, Paheng (*type*).

(14) **P. pyramidata** Wall. ex Schauer in DC. Prodr. **11**, 633 (1847); C. B. Clarke in F.B.I. **576**; Brand. Ind. Trees **510**; K. and G. Mat. **822**; Lam Verb. **155**; Ridl. F.M.P. **622**. *P. tomentosa* Kurz For. Fl. **260** (1877).

PAYAP. Chiengdao, Muang Kawng, c. **600** m., mixed forest by stream, *Kerr* 5529. Me Teng, c. **400** m., mixed forest by stream, *Kerr* 5632. Lampun, Me Kaw, upper mixed forest, *Winit* **414**. NAKAWN SAWAN. Kampengpet, Me Klawng, c. **500** m., mixed deciduous forest, *Kerr* 6138. RACHABURI. Kanburi, Baw Re, *Put* 208. Prachuap, Bangtapan, **15** m., moist mixed forest, *Winit* **572**. Prachuap, Kao Luang, c. **400** m., evergreen forest, *Kerr* 11012. SURAT. Surat, Kanchanadit, c. **5** m., scrub, *Kerr* 13117. PUKET. Langkawi, *Curtis* 2552. PATTANI. Pattani, Bukit, c. **50** m., evergreen forest, *Kerr* 7109.

Distrib. Burma (*type*), Malaya.

(15) **P. Collinsae** Craib in Kew Bull. **283** (1914); Dop in F.I.C. **812**.

MAHARAT. Lampang, Me Kang, c. **230–330** m., shady banks of stream, *Winit* **1405**, **729**. Me Peng, c. **150** m., village scrub, *Winit* **1934**. NAKAWN SAWAN. Kampengpet, c. **50** m., mixed deciduous forest, *Kerr* 5991. PITSANULOK. Petchabun, c. **50** m., mixed forest, *Kerr* 5677. UDAWN. Udawn, Nawng Bua, c. **300** m., rocky limestone hill, *Kerr* 8621. Kawn Ken, c. **100** m., mixed forest by stream, *Kerr* 20686. PRACHINBURI. Kaw Pai, **1** m.,

clearing near sea, *Marcan* 2320. Sriracha, 10 m., pathside, *Marcan* 168. c. 5 m., *Mrs. D. J. Collins* 109 (*type*). KRUNGTEP. Bangkok, fruit garden, *Marcan* 2018. RACHABURI. Kanburi, Bawngti, c. 200 m., deciduous forest, on rocky hill, *Kerr* 10596.

(16) **P. flavescens** *Ham. ex C. B. Clarke* in F.B.I. 578 (1885); *Brand. Ind. Trees*, 511; *Lam Verb.* 136; *Dop* in F.I.C. 810.

MAHARAT. Lampang, Muang Ngao, *Put* 4011. RACHABURI. Kanburi, Hin Dat, *Put* 28.

Distrib. Burma, Assam (*type*—Goalpara), French Indo-China (ex F.I.C.), Malaya.

(17) **P. flavescens** *Ham. var. glabrior C. B. Clarke* in F.B.I. 578 (1885); *Lam Verb.* 137.

SURAT. Chumpawn, Siepyuan, c. 10 m., scrub, *Kerr* 16243. Surat, Yan Yao, c. 50 m., savannah, *Kerr* 18178. NAKAWN SRITAMARAT. Nakawn Sritamarat, Lam Saka, under 50 m., scrub, *Kerr* 15383.

Distrib. Burma, Assam (*type*—Sylhet).

(18) **P. fulva** *Craib* in *Kew Bull.* 442 (1911); *Craib* 163; *Dop* in F.I.C. 809.

PAYAP. Doi Sute, c. 660 m., *Kerr* 1085 (*type*). Lampun, Me Li, c. 510 m., near stream, *Winit* 262. NAKAWN SAWAN. Kampengpet, Me Lamung, c. 500 m., woody climber, scrub jungle, *Kerr* 6099.

Distrib. French Indo-China (ex F.I.C.).

(19) **P. latifolia** *Roxb.* *Hort. Beng.* 46 (1814), *nomen tantum*, et *Fl. Ind.* 3, 76 (1832); *C. B. Clarke* in F.B.I. 577; *Brand. Ind. Trees* 511; *Lam Verb.* 150; *P'ei Verb.* 77; *Dop* in F.I.C. 808.

PAYAP. Chiengmai, Pang Tawn, *Put* 3937. Muang Fang, c. 500 m., scrub jungle, *Kerr* 5226. Lampun, Me Kaw, c. 270–390 m., near stream, *Winit* 261. MAHARAT. Pre, c. 200 m., open dry forest, *Winit* 1659. NAKAWN CHAIS. Supan, Dom Bang, c. 20 m., scrub jungle, *Kerr* 6997. RACHABURI. Ratburi, c. 30 m., scrub, *Marcan* 1778.

Distrib. India (*type*—Coromandel), Burma, Cambodia, Philippines (ex *Lam*).

(20) **P. latifolia** *Roxb. var. cuneata C. B. Clarke* in F.B.I. 578 (1885); *Lam Verb.* 151; *Dop* in F.I.C. 809. *P. viburnoides* *Wall.*; *Kurz For. Fl.* 261 (1877).

MAHARAT. Pre, Me Chawa, c. 150 m., *Vanpruk* 462, 142. Doi Din Deng, c. 420 m., mixed jungle, *Kerr* 2557.

Distrib. Burma (*type*), French Indo-China (ex F.I.C.).

(21) **P. latifolia** *Roxb. var. mucronata (Roxb.) C. B. Clarke* in F.B.I. 578 (1885); *Lam Verb.* 151. *P. mucronata* *Roxb. Fl. Ind.* 3, 635 (1832); *Brand. Ind. Trees* 511, *in nota*.

NAKAWN SRITAMARAT. Nakawn Sritamarat, Wat Kiriwong, c. 100 m., scrub, *Kerr* 15579.

Distrib. N. India, Burma, Assam (*type*—Sylhet). Philippines (ex *Lam*).

(22) **P. nana** *Coll. et Hemsl.* in Journ. Linn. Soc. **28**, 109 (1891) ; Brand. Ind. Trees **511** ; Dop in F.I.C. **816** ; Craib **164**.

PAYAP. Chiengrai, Muang Payao, *Put* 3966. Doi Sutep, c. 300–600 m., deciduous forest, *Kerr* 1127. Lampun, Me Li, c. 390 m., deciduous forest, *Winit* 263. Lampun, Me Ta, c. 360 m., *Winit* 731. NAKAWN SAWAN. Nakawn Sawan, Hua Wai, *Put* 4064.

Distrib. Upper Burma (*type*).

(23) **P. herbacea** *Roxb.* Hort. Beng. **46** (1814), *nomen tantum*, et Fl. Ind. **3**, 80 (1832) ; C. B. Clarke in F.B.I. **581** ; Brand. Ind. Trees **511** ; P'ei Verb. **71** ; Dop in F.I.C. **815** ; Craib **164**.

PAYAP. Chiengrai, Muang Payao, *Put* 3983. Doi Sutep, c. 330–600 m., deciduous forest, *Kerr* 1218. NAKAWN SAWAN. Nakawn Sawan, Huz Wai, *Put* 4040. UDAWN. Nakawn Panom, Muk Dahan, c. 100 m., deciduous forest, *Kerr* 21819. PRACHINBURI. Krabin, Aranya, *Put* 2045, **3124**.

Distrib. India (*type*—Bengal), Assam, Hainan, French Indo-China (ex *F.I.C.*).

(24) **P. serrata** *Fletcher* in Kew Bull. **202** (1938).

NAKAWN SAWAN. Kampengpet, Kao Hua Mot, c. 900 m., savannah limestone, *Kerr* 6122 (*type*).

(25) **P. amplexans** *Wall. ex Schauer* in DC. Prodr. **11**, 636 (1847) ; Kurz For. Fl. **262** ; C. B. Clarke in F.B.I. **580** ; Brand. Ind. Trees **511**.

NAKAWN SAWAN. Muang Tak, Me Sawt, c. 200 m., mixed deciduous forest, *Kerr* 6159.

Distrib. Burma (*type*—Rangoon).

(26) **P. paniculata** *Fletcher* in Kew Bull. **201** (1938).

RACHABURI. Prachuap, Pak Tawan, c. 20 m., dry evergreen forest, *Kerr* 20536 (*type*).

(27) **P. annulata** *Fletcher* in Kew Bull. **199** (1938).

NAKAWN SRITAMARAT. Patalung, Sak, under 50 m., scrub by stream, *Kerr* 19269 (*type*).

(28) **P. repens** *Fletcher* in Kew Bull. **202** (1938).

RACHABURI. Prachuap, Sam Roi Yawt, c. 500 m., *Kerr* 10950 (*type*).

(29) **P. siamensis** *Fletcher* in Kew Bull. **203** (1938).

PAYAP. Chiangmai, Pang Tawn, *Put* 3810 (*type*).

(30) **P. quadridentata** *Fletcher* in Kew Bull. **201** (1938).

PUKET. Ranawng, Kaw Chang, edge of evergreen forest bordering beach, *Kerr* 16563 (*type*).

Gmelina Linn.

Inflorescence a small compact terminal panicle ; calyx with 4 teeth and corolla with 4 lobes :

Leaves at most 5 cm. broad and strongly tapering at the base.....

(1) *G. attenuata*

Leaves at least 5 cm. broad, hardly cuneate at the base.....

(2) *G. paniculata*

Inflorescence a large terminal panicle, or a small terminal raceme of cymes :

Inflorescence a large terminal panicle ; calyx with 5 small teeth and corolla with 5 lobes.....(3) *G. arborea*

Inflorescence a small terminal raceme of cymes ; calyx with 4 small teeth and corolla with 4 lobes :

Bracts leafy.....(4) *G. Hystrix*

Bracts small, linear :

Leaves tomentose below :

Leaves elliptic, mature leaves slightly cuneate, faintly pubescent, but more often glabrous above.....

(5) *G. villosa*

Leaves ovate to slightly elliptic, mature leaves deltoid at the base, tomentose above.....(6) *G. tomentosa*

Leaves glabrous or occasionally faintly pubescent below.....

(7) *G. asiatica*

(1) ***G. attenuata*** Fletcher in Kew Bull. 203 (1938).

PAYAP. Chiangmai, c. 1100 m., open grassy forest, Kerr 6224 (type).

(2) ***G. paniculata*** Fletcher in Kew Bull. 204 (1938).

PRACHINBURI. Krabin, Aranya, Put 2086 (type).

(3) ***G. arborea*** Roxb. Hort. Beng. 46 (1814), *nomen tantum*, et Cor. Pl. 3, 41, t. 246 (1819) et Fl. Ind. 3, 84 ; Kurz For. Fl. 264 ; C. B. Clarke in F.B.I. 581 ; Brand. Ind. Trees 509 ; Lam Verb. 219 ; Bakh. Verb. 68 ; P'ei Verb. 117 ; Dop in F.I.C. 843 ; Craib 164.

PAYAP. Doi Suteh, c. 700-900 m., *Hosseus* 576—"as to flowers only, the leaves being those of *Colona floribunda* (Kurz)"—Craib. Ibid., c. 690 m., deciduous at time of flowering, Kerr 540. MAHARAT. Lampang, c. 240 m., scrub jungle, Kerr 2331. RACHASIMA. Chaiyapum, Pu Kio, c. 900 m., evergreen forest, Kerr 20271. Korat, Bukanum, c. 400 m., savannah, Kerr 9856. SURAT. Surat, Ta Kanawn, under 50 m., open deciduous forest, Kerr 12356. PUKET. Langkawi, Curtis. NAKAWN SRITAMARAT. Songkla, Singora, Annandale.

Distrib. India (type), Yunnan, Burma, French Indo-China (ex F.I.C.), Malay Archipelago, Philippines.

(4) ***G. Hystrix*** Schult. ex Kurz in Journ. As. Soc. Beng. 39, 2, 81 (1870) ; For. Fl. 265 ; C. B. Clarke in F.B.I. 582 ; Brand. Ind. Trees 509 ; Williams 431 ; K. and G. Mat. 823, *in nota* ; Ridl. F.M.P.

623 ; Dop in F.I.C. 842. *G. asiatica* Lam Verb. 221, non Linn. *G. asiatica* Linn. var. *philippinensis* (Cham.) Bakh. Verb. 70 (1921).

PAYAP. Lampun, Me Li, c. 480 m., deciduous forest, *Winit* 412. MAHARAT. Lampang, Me Ta, 360 m., moist mixed forest, *Winit* 1653. Pre, Me Chawa, c. 150 m., trunk armed with spines 2" long, *Vanpruk* 461. PITSANULOK. Pamak, 100 m., scrub, *Kerr*. KRUNGTEP. Bangkok, *Zimmermann* 71. *Schomburgk* 197, 331. *Murton* 33. *Teysmann* 5946 (type). *Kerr* 10704. *Marcan* 847. RACHABURI. Petchabun, c. 100 m., deciduous forest, *Kerr* 5724. SURAT. Surat, Nawng Wai, c. 50 m., scrub, *Kerr* 12293. Surat, Kaw Samui, *Put* 1319. NAKAWN SRITAMARAT. Tungsong, in rice field, *Rabil* 145. Nakawn, Kuan Krot, 90 m., *Vanpruk* 714. PATTANI. Pattani, Kok Po, under 50 m., scrub, *Kerr* 15067.

Distrib. Tenasserim, French Indo-China (ex *F.I.C.*). Philippines, Malay Peninsula.

(5) *G. villosa* Roxb. Hort. Beng. 46 (1814), *nomen tantum*, et Fl. Ind. 3, 86 (1832) ; C. B. Clarke in F.B.I. 582 ; Brand. Ind. Trees 509 ; K. and G. Mat. 824 ; Ridl. i. 156 ; Craib 164 ; Lam Verb. 217 ; Ridl. F.M.P. 623 ; Dop in F.I.C. 846. *G. asiatica* Kurz For. Fl. 265, non Linn. *G. asiatica* Linn. var. *villosa* (Roxb.) Bakh. Verb. 70 (1921).

NAKAWN SAWAN. Raheng, Kempengpet, c. 90 m., common along bank of Me Ping, *Kerr* 2991. Paknampo, 15-50 m., *Vanpruk* 1013. PITSANULOK. Petchabun, *Bourke*. PRACHINBURI. Sriracha, Ban Dan, forest clearing, *Marcan* 153. Nawng Kaw, c. 70 m., *Marcan* 1207. Kao Din, c. 18 m., *Mrs. D. J. Collins* 2065, 934. KRUNGTEP. Bangkok, hedgerow, *Kerr* 10666. RACHABURI. Kanburi, *Teysmann* 5941. Hin Dat, *Put* 74. *Marcan* 914. c. 100 m., bamboo forest, *Kerr* 10577. Rachaburi, Ta Ruo, c. 6 m., scrub jungle, *Winit* 411. Prachuap, Hui Yang, under 50 m., scrub, *Kerr* 10740. PUKET. Pang-nga, Kaw Yao Yai, c. 10 m., scrub, *Kerr* 17330. Satul, Terutao, scrub behind beach, *Kerr* 14171. Langkawi, *Curtis* (ex *Ridl.*). NAKAWN SRITAMARAT. Songkla, Na Tawa, *Rabil* 76. Tepa, *Lakshnakara* 358.

Distrib. Burma, French Indo-China (ex *F.I.C.*), Malaya (type—Penang), Philippines.

The above collections may contain more than one species. *Kerr* 10740, 10577, *Put* 74, *Marcan* 914, all have the ovary tufted with tawny hairs and a strongly tapering leaf base, whereas the true *villosa* has a glabrous ovary and a cuneate leaf base. The material however, is so scanty that separation is not justified.

(6) *G. tomentosa* Fletcher in Kew Bull. 204 (1938).

RACHASIMA. Korat, Ban Chum Seng, *Noe* 211 (type).

(7) *G. asiatica* Linn. Sp. Pl. 626 (1753) ; C. B. Clarke in F.B.I. 582 ; Brand. Ind. Trees 509 ; K. and G. Mat. 823 ; Lam Verb. 221 *pro parte* ; Ridl. F.M.P. 622 ; P'ei Verb. 119 ; Dop in F.I.C. 845. *G. asiatica* L. var. *typica* Bakh. Verb. 69 (1921).

UDAWN. Nakawn Panom, Dawn Tam, c. 100 m., rocky ground in open deciduous forest, *Kerr* 21527. UBON. Ubon, near river, *Lakshnakara* 859. RACHASIMA. Chaipayum, Chawng Sam Maw, c. 200 m., scrubby deciduous forest, *Kerr* 19974. AYUTHIA. Angtawng, *Put* 2552. NAKAWN CHAIS. Supan, Dom Bang, c. 20 m., on river bank, *Kerr* 7005.

Distrib. S. India (*type*), Burma, French Indo-China (ex *F.I.C.*), Malaya.

Clerodendrum Linn.

Corolla hypocrateriform, the tube less than 5 cm. in length (subgenus

1. *Euclerodendrum*, C. B. Clarke) :

Cymes axillary or in terminal leafy panicles, the lower branches being axillary :

Cymes axillary :

Cymes few-flowered from most axils ; calyx teeth very short :

Leaves elliptic to lanceolate ; calyx only faintly glandular without.....(1) *C. neriifolium*

Leaves ovate to elliptic ; calyx markedly glandular without.....(2) *C. inerme*

Cymes in deflexed pedunculate close panicles from the upper axils ; calyx lobes linear-lanceolate.....(3) *C. deflexum*

Cymes in terminal leafy panicles, the lower branches being axillary :

Calyx lobes glabrous within :

Leaves elliptic, glabrous above or occasionally with a slight pubescence on the nerves...(4) *C. disparifolium*

Leaves oblong to obovate, thinly covered with jointed hairs above.....(5) *C. lankawiense*

Calyx lobes markedly pubescent within :

Leaves markedly pubescent above with jointed hairs ; corolla tube at most 2.5 cm. long...(6) *C. Lloydianum*

Leaves slightly pubescent above with short hairs ; corolla tube at least 2.5 cm. long.....(7) *C. Garrettianum*

Cymes in definite terminal panicles :

Panicle more or less pendulous :

Leaves glabrous below, occasionally very faintly pubescent along the midrib :

Leaves at most 6 cm. broad and slightly tapering at the base ; calyx lobes lanceolate.....(8) *C. penduliflorum*

Leaves at least 6 cm. broad, and round, sometimes slightly attenuate at the base ; calyx lobes ovate, cuspidate...
(9) *C. umbratile*

Leaves pubescent below, almost deltoid to lobed at the base...
(10) *C. Schmidtii*

Panicle erect :

Panicle elongate or pyramidal :

Panicle elongate :

- Main peduncles to the cymes 0.5–1 cm. long ; calyx teeth at least 1 mm. long ; leaf margin very deeply serrate.....(11) *C. Vanprukii*
- Main peduncles to the cymes 1.5–5.5 cm. long ; calyx often truncate, teeth at the most 0.75 mm. long ; leaf margin distantly serrate or denticulate :
- Leaves and bracts in pairs, petiole at least 2 cm. long, leaf margin generally subentire ; inflorescence at most 15 cm. long :
- Leaves glabrous above and below...(12) *C. venosum*
- Leaves strongly pubescent above on the midrib and the lateral nerves and on all the nerves below... (13) *C. venosum* var. *pubescens*
- Leaves often ternate and the bracts generally so, leaves sessile or petiolate, leaf margin distantly serrate or denticulate ; inflorescence at least 15 cm. long :
- Leaves sessile, cuneate at the base..... (14) *C. serratum*
- Leaves generally petioled, but sometimes only slightly so when bordered by the decurrent margins of the leaf-blade, acuminate narrowed at the base.....(15) *C. serratum* var. *Wallichii*
- Panicle pyramidal :
- Leaves lobed.....(16) *C. paniculatum*
- Leaves ovate, generally cordate, not lobed :
- Leaves entire ; calyx lobes divided little more than half-way down the tube.....(17) *C. villosum*
- Leaves often dentate ; calyx lobes divided almost to the base of the tube.....(18) *C. infortunatum*
- Panicle corymbose or subcapitate :
- Panicle corymbose ; calyx-teeth small, at most 1 mm. long(19) *C. glandulosum*
- Panicle subcapitate ; calyx-lobes large, at least 8 mm. long :
- Corolla tube at least 3 cm. long ; calyx-lobes triangular-lanceolate, at least 10 mm. long..... (20) *C. lasiocephalum*
- Corolla tube at most 2 cm. long ; petals 10 ; calyx lobes triangular, acuminate, at most 10 mm. long..... (21) *C. fragrans*
- Corolla infundibuliform, tube more than 5 cm. long (subgenus 2. *Siphonanthus*, C. B. Clarke) ; leaves usually verticillate, lanceolate.....(22) *C. indicum*
- (1) *C. neriifolium* Wall. ex Schauer in DC. Prodr. 11, 660 (1847) ; C. B. Clarke in F.B.I. 589 ; Brand. Ind. Trees 507 ; Ridl. i. 156 ; Craib 165 ; Ridl. iv. 111. *C. inerme* Gaertn. var. *neriifolium* Wall. ; Kurz For. Fl. 266 (1877). *C. inerme* Gaertn. ; Lam Verb. 251 (1919) *pro parte* ; Bakh. Verb. 77 ; Dop in F.I.C. 854, *pro parte*.

PRACHINBURI. Sriracha, sea shore, *Kerr* 2039, *Kerr* 2127, *Mrs. D. J. Collins* 96. PUKET. Ranawng, Nam Chut, near sea-level, bank of tidal creek, *Kerr* 11693. Trang, Klawng Pao, prostrate shrub, sand bank, edge of mangrove swamp, *Vanpruk* 839. Langkawi, *Curtis* (ex *Ridl.*).

Distrib. Burma (*type*), French Indo-China (ex *F.I.C.*), Malaya, China, Australia, Polynesia.

(2) **C. inerme** *Gaertn.* *Fruct.* 1, 271, t. 57, fig. 1 (1788); *Kurz* *For. Fl.* 266, *pro parte*; C. B. Clarke in *F.B.I.* 589; *Brand. Ind. Trees* 507; *F.K.C.* 173; *Williams* 431; *Lam Verb.* 251, *pro parte*; *Ridl. F.M.P.* 624; *P'ei Verb.* 127; *Dop* in *F.I.C.* 854, *pro parte*. *C. neriifolium* *Wall.*; *K. and G. Mat.* 827 (1909).

PRACHINBURI. Sriracha, Na Kati, c. 12 m., *Mrs. D. J. Collins* 1440. KRUNGTEP. Bangkok, tidal, common along banks of rivers and canals, *Kerr* 3672. Bangkok, sea level, *Smith* 928. RACHABURI. Prachuap, Hua Hin, open scrub near the sea, *Kerr* 16133. Kao Tao, sea level, cleft in rocks on sea shore, *Marcan* 2456. SURAT. Chumpawn, Bang Son, *Put* 1538. Langsuan, Tako, *Put* 1701. PUKET. Pang-nga, Kaw Yao Yai, edge of sandy beach, *Kerr* 17037. Trang, *Bourke*.

Distrib. India, Ceylon (*type*), Burma, French Indo-China (ex *F.I.C.*), Malaya.

(3) **C. deflexum** *Wall.* *Pl. As. Rar.* 3, 10, t. 215 (1832); C. B. Clarke in *F.B.I.* 593; *K. and G. Mat.* 829; *Lam Verb.* 263; *Bakh. Verb.* 82; *Ridl. F.M.P.* 624.

PATTANI. Pattani, Betong, c. 600 m., evergreen forest, *Kerr* 7653.

Distrib. Malaya (*type*—Penang).

(4) **C. disparifolium** *Blume* *Bijdr.* 809 (1826); C. B. Clarke in *F.B.I.* 589; *K. and G. Mat.* 829; *Lam Verb.* 250; *Bakh. Verb.* 83; *Ridl. F.M.P.* 625.

PAYAP. Chiangmai, 300 m., cultivated, *Kerr* 3495, 6702. waste ground, c. 310 m., *Garrett* 899. MAHARAT. Pre, 120 m., cultivated, *Winit* 1690. Lampang, often with many root suckers, cultivated, probably exotic, *Winit* 643. PRACHINBURI. Sriracha forest, c. 24 m., *Mrs. D. J. Collins* 85, 1078. AYUTHIA. Angtawng, *Put* 2547. KRUNGTEP. Bangkok, *Kerr* 14357. *Marcan* 484, 2301. PUKET. Trang, Kao Soi Dao, c. 400 m., evergreen forest, *Kerr* 19146. PATTANI. Pattani, Kao Kalakiri, c. 600 m., clearing in evergreen forest, *Kerr* 7762. c. 50 m., *Kerr* 7821. Tomo, Ban Rubi, c. 150 m., *Lakshnakara* 665.

Distrib. Malaya (*type*—Java).

(5) **C. lankawiense** *King et Gamble* in *Kew Bull.* 110 (1908) et *Mat.* 830; *Ridl. i.* 156; *Lam Verb.* 249; *Bakh. Verb.* 95; *Ridl. F.M.P.* 625.

SURAT. Chumpawn, Tasan, c. 50 m., evergreen forest, *Kerr* 16283. *Kerr* 16283A. Langsuan, Ban Trang, c. 50 m., by stream in

evergreen forest, *Kerr* 11979. Surat, Klawng Nam Wing, c. 300 m., evergreen forest, *Kerr* 12927. PUKET. Ranawng, Nam Chut, near sea level, scrub by stream, *Kerr* 11722. Kao Pawta Luang Keo, c. 900 m., evergreen forest, *Kerr* 17535. Kopah, Ban Krap, c. 210 m., *Haniff et Nur* 2735, 2084. Langkawi, Burau, *Robinson* 6257, 2515 (ex *Ridl.*). Terutao, *Curtis* 3789 (type).

Distrib. Malay Peninsula.

(6) **C. Lloydianum** *Craib* in *Kew Bull.* 284 (1914) ; *Dop* in *F.I.C.* 871.

PAYAP. Lampun, Me Kaw, c. 480 m., mixed forest, *Winit* 1532. MAHARAT. Lampang, Pratu Pa, c. 450 m., mixed forest, *Winit* 1809. Pre, c. 180 m., *Vanpruk* 499 (type). NAKAWN SAWAN. Me ping Rapids, Keng Fa Pin, c. 200 m., *Kerr* 3049. Keng Chum, c. 150 m., mixed forest by stream, *Kerr* 4618. AYUTHIA. Saraburi, Muak Lek, c. 200 m., evergreen forest near stream, *Marcan* 1846.

(7) **C. Garrettianum** *Craib* in *Kew Bull.* 444 (1911) ; *Craib* 165. *Dop* in *F.I.C.* 868. *C. disparifolium* *Bakh. Verb.* 83 (1921), *pro parte*, *non* Blume.

PAYAP. Chiengrai, c. 520 m., evergreen forest, *Winit* 780. Doi Sutep, c. 690 m., c. 1050 m., evergreen forest, *Kerr* 1309, 1435 (types). c. 180 m., *Kerr* 3392. c. 530 m., *Winit* 1170. MAHARAT. Lampang, Me Het, c. 200 m., evergreen forest, *Winit* 1476. Ban Tang Chai, *Winit* 1475. NAKAWN SAWAN. Ban Takli, c. 25 m., *Marcan* 1073. RACHASIMA. Korat, Chantuk, Kao Sisiat A, c. 400 m., crevices of limestone rocks, *Kerr* 9101. AYUTHIA. Ban Nawng Bua, *Put* 1143. PRACHINBURI. Krabin, Watana, *Put* 1939.

Distrib. Laos (ex *F.I.C.*).

(8) **C. penduliflorum** *Wall. ex Schauer* in *DC. Prodr.* 11, 664 (1847) ; *C. B. Clarke* in *F.B.I.* 591 ; *Brand. Ind. Trees* 508 ; *K. and G. Mat.* 830 ; *Ridl. i.* 156 ; *Lam Verb.* 265 ; *Ridl. F.M.P.* 626. *C. nutans* *Wall.* ; *Bakh. Verb.* 81.

PAYAP. Chiangmai, Doi Nang Ka, *Put* 3284. PRACHINBURI. Sriracha, *Put* 435. Nawng Nam Kio, c. 180–240 m., *Mrs. D. J. Collins* 1283. Kao Pi, low hill near Nawng Nam Kio, *Mrs. D. J. Collins* 1283A. CHANTABURI. Krat, Baw Rai, c. 50 m., by stream in bamboo forest, *Kerr* 9448. RACHABURI. Kanburi, Ta Kanum, c. 300 m., limestone rocks, *Kerr* 10282. SURAT. Chumpawn, Kuring, c. 50 m., scrub, *Kerr* 11614. Tasan, c. 50 m., evergreen forest, *Kerr* 16284. PUKET. Trang, Chawng, *Fox* 3830. Satul, Tola, c. 50 m., light evergreen forest, *Kerr* 14379. Langkawi, *Haniff et Nur* 7530. *Dolman* 6784. NAKAWN SRITAMARAT. Nakawn Sritamarat, Ta Samet, under 50 m., evergreen forest, *Kerr* 14291A. PATTANI. Yala, *Annandale*.

Distrib. Burma (type—Tavoy), Malay Peninsula, cultivated in the Archipelago (ex *Bakhuizen*).

(9) **C. umbratile** *King et Gamble* in Kew Bull. 110 (1908) et Mat. 831; Lam Verb. 265; Ridl. F.M.P. 626. *C. macrophyllum* Bl. var. *myrmecophilum* Ridl.; Bakh. Verb. 82 (1921).

SURAT. Chumpawn, Kao Tung, c. 500–700 m., evergreen forest, *Kerr* 11532. Surat, Klawng Nam Wing, c. 100 m., evergreen forest, *Kerr* 12247. PATTANI. Pattani, Bukit, *Put* 3602.

Distrib. Malaya (*type*—Perak).

(10) **C. Schmidtii** *C. B. Clarke* apud Schmidt in Bot. Tidsskr. 26, 173 (1904), *ex descr.*; Williams 432; Dop in F.I.C. 877. *C. hastato-oblongum* *C. B. Clarke* apud Schmidt l.c. 174, *ex descr.*; Dop in F.I.C. 877.

CHANTABURI. Chantabun, Makam, near path in open forest, *Lakshnakara* 469. Near mouth of Chantabun river, c. 5 m., evergreen scrub, *Kerr* 18063. Kaw Chang, Klawng Salakpet, Klawng Nonsi, *Schmidt* 740, 475 (*types*). Kaw Chang, Klawng Son, *Schmidt* 692A (*type* of *C. hastato-oblongum*). Kaw Chang, Salak Kawk, c. 10 m., evergreen forest by stream, *Kerr* 9217. Krat, Kao Saming, c. 20 m., evergreen forest, *Kerr* 9398. PRACHINBURI. Krabin, Ban Keng, c. 25 m., *Kerr* 19804. Sriracha, c. 9 m., *Mrs. D. J. Collins* 281, 1379, 367. *Put* 443. Near Sriracha, c. 12 m., *Mrs. D. J. Collins* 1003. Sriracha, Nawng Kaw forest, *Mrs. D. J. Collins* 623.

Distrib. Laos (*ex F.I.C.*).

(11) **C. Vanprukii** *Craib* in Kew Bull. 444 (1911); Dop in F.I.C. 883; Craib 166.

MAHARAT. Lampang, Me Peng, c. 110–200 m., moist mixed forest, *Winit* 1695. Pre, Hui Kammi, 240 m., *Vanpruk* 207 (*type*).

(12) **C. venosum** *Wall. ex C. B. Clarke* in F.B.I. 592 (1885); Brand. Ind. Trees 508. *C. serratum* (Linn.) Spreng.; Bakh. Verb. 78 (1921), *pro parte*.

RACHABURI. Kanburi, Baw Re, *Put* 191.

Distrib. Assam, Burma (*type*).

(13) **C. venosum** *Wall.* var. **pubescens** *Fletcher* in Kew Bull. 205 (1938).

PAYAP. Chiangmai, Me Tun, c. 600 m., mixed forest, *Kerr* 6190 (*type*).

(14) **C. serratum** (Linn.) *Spreng.* Syst. Veg. 2, 758 (1825); Kurz For. Fl. 267; *C. B. Clarke* in F.B.I. 592; Brand. Ind. Trees 508; Lam Verb. 267; Bakh. Verb. 78; Ridl. F.M.P. 626; P'ei Verb. 129; Dop in F.I.C. 856.

PAYAP. Chiengrai plain, right bank of Me Kok, west of town, c. 380 m., edge of open grassland, *Garrett* 180. RACHASIMA. Korat, Ban Chum Seng, *Noe* 214. *Put* 3064. KRUNGTEP. Bangkok, below 5 m., *Kerr* 4228. *Marcant* 243. RACHABURI. Ratburi, c. 30 m., deciduous forest, *Marcant* 1780. SURAT. Ban Tong Tao, c. 10 m., scrub, *Kerr* 13158. PUKET. Trang, Chawng, c. 120–240 m., *Mrs. D. J. Collins* 2399.

Distrib. India (*type*), Ceylon, Bengal, Burma, Malaya, French Indo-China.

(15) **C. serratum** (Linn.) Spreng. var. **Wallichii** C. B. Clarke in Fl. Br. Ind. 592 (1885); K. and G. Mat. 834; Craib 166; Lam Verb. 268.

PAYAP. Doi Sutep, c. 900 m., evergreen forest, *Kerr* 735, 735A. Doi Sutep, c. 300 to 450 m., deciduous forest, *Kerr* 754. Lampun, Me Li, c. 390 m., *Winit* 417. NAKAWN SAWAN. Nakawn Sawan, Hau Wai, *Put* 4061. UDAWN. Udaun, Nawng Ham, sandy soil, *Lakshnakara* 1038. PRACHINBURI. Krabin, Aranya, *Put* 2036. RACHABURI. Kanburi, Hin Dat, *Put* 134.

Distrib. British Indo-China (*type*—Sylhet), Malaya, Cambodia.

(16) **C. paniculatum** Linn. Mant. 1, 90 (1767); C. B. Clarke in F.B.I. 593; Brand. Ind. Trees 508; Williams 432; K. and G. Mat. 839; Ridl. i. 156; Ridl. iii. 165; Lam Verb. 269; Bakh. Verb. 92; Ridl. F.M.P. 628; P'ei Verb. 144; Dop in F.I.C. 864.

PAYAP. Chiangmai, c. 300 m., cultivated, *Garrett* 1010. Doi Sutep, deciduous forest, c. 300–720 m., *Kerr* 762. Lampun, Me Kaw, c. 420 m., scrub jungle, *Winit* 415. UBON. Ubon, Warin, *Lakshnakara* 875. AYUTHIA. Saraburi, Muak Lek, c. 200 m., open space in evergreen forest, *Kerr* 9072. PRACHINBURI. Sriracha, c. 9 m., *Mrs. D. J. Collins* 210. Kao Chalak, c. 12–120 m., *Mrs. D. J. Collins* 1475. KRUNGTEP. Bangkok, under 5 m., village thicket, *Kerr* 4436. Marcan 414. *Lakshnakara* 439. RACHABURI. Kanburi, Hin Dat, *Put* 31. Sai Yok, c. 50 m., bamboo forest, *Marcan* 2383. Prachuap, Hui Yang, under 50 m., cultivated, *Kerr* 10739. Bangtapan, *Keith* (ex *Ridl.*). PUKET. Trang, Chawng, c. 30 m., *Mrs. D. J. Collins* 2831. NAKAWN SRITAMARAT. Nakawn Sritamarat, Ta Sala, under 50 m., scrub, *Kerr* 15616. Kao Keo and Rawnpibun, *Kerr* 513. SIAM. *Schomburgk* 249.

Distrib. Burma, Laos, Annam, Malay Peninsula (*type*—Penang), Sumatra, Java (ex *Bakhuizen*), Hainan, Formosa.

(17) **C. villosum** Blume Bijdr. 811 (1826); Kurz For. Fl. 268; C. B. Clarke in F.B.I. 595; Brand. Ind. Trees 507; F.K.C. 173; Williams 432; K. and G. Mat. 837; Ridl. i. 156; Lam Verb. 289; Bakh. Verb. 89; Ridl. F.M.P. 627; Dop in F.I.C. 861.

MAHARAT. Doi Wao, c. 90 m., old clearing, *Kerr* 2441. Lampang, Me Tawn, c. 900 m., *Winit* 701. CHANTABURI. Chantabun, *Lakshnakara* 448. Krat, Kao Kuap, c. 200 m., clearing in evergreen forest, *Kerr* 17696. PRACHINBURI. Nawng Yai Bu to Nawng Kaw, c. 30–60 m., near railway, *Mrs. D. J. Collins* 348. Kao Din, Sriracha forest, c. 12 m., *Mrs. D. J. Collins* 1876. Hot Springs, Sriracha forest, c. 12 m., *Mrs. D. J. Collins* 1789. Kaw Chang 318. RACHABURI. Bangtapan, *Keith* (ex *Ridl.*). PUKET. Kopah, Yanyan *Haniff et Nur* 2051. Ranawng, Kao Pawta, Chongdong, c. 500 m., bamboo scrub, *Kerr* 16747. La-un, c. 10 m., scrub, *Kerr* 16505. Satul, Tapan Lek, c. 50 m., common in scrub, *Kerr* 14397.

NAKAWN SRITAMARAT. Kao Keo, 483. Songkla, Kaw Deng, *Annandale*. PATTANI. Tomo, Ban Pari, c. 150 m., *Lakshnakara* 789. Yala, *Put* 3684. SIAM. *Schmidt* 12.

Distrib. Burma, Tonkin, Laos (ex *F.I.C.*), Malaya (*type*—Java).

(18) **C. infortunatum** *Linn.* Sp. Pl. 637 (1753) ; Kurz For. Fl. 267 ; C. B. Clarke in *F.B.I.* 594 ; Brand. Ind. Trees 507 ; Williams 432 ; K. and G. Mat. 836 ; Ridl. i. 156 ; Hoss. 429 ; Craib 165 ; Lam Verb. 284 ; Ridl. iv. 111 ; Bakh. Verb. 91 ; Ridl. F.M.P. 629, *in nota* ; Dop in *F.I.C.* 859.

PAYAP. Doi Sutep, c. 300–750 m., *Kerr* 1094. Lampun, Me Li, c. 420 m., a gregarious shrub in open places, *Winit* 258. MAHARAT. Lampang, Me Lawng, c. 130 m., moist mixed and evergreen forest, *Winit* 1638. KRUNGTEP. Bangkok, tidal, waste ground, *Kerr* 4068. *Marcan* 94. *Schomburgk* 106. RACHABURI. Prachuap, Klawng Wan, *Hamid* 3790. SURAT. Chumpawn, Siepyuan, *Put* 990. Surat, Klawng Nam Wing, c. 200 m., by stream in evergreen forest, *Kerr* 12228. PUKET. Tapli, *Kloss* 6784. Ranawng, Nam Chut, *Kloss* 6673. SIAM. *Teysmann* 5957.

Distrib. India, Ceylon (*type*), Burma, Tonkin, Laos (ex *F.I.C.*), Malaya.

(19) **C. glandulosum** *Colebr. ex Wall.* list no. 1806 (1829), *nomen tantum* ; *Lindl.* Bot. Reg. 30 sub t. 19 (1844) ; P'ei Verb. 158. *C. Colebrookianum* Walp. Rep. 4, 114 (1848) ; C. B. Clarke in *F.B.I.* 594 ; Brand. Ind. Trees 507 ; K. and G. Mat. 837 ; Craib 165 ; Lam Verb. 271 ; Bakh. Verb. 87 ; Ridl. F.M.P. 629, *in nota* ; Dop in *F.I.C.* 860.

PAYAP. Chiangmai, edge of a clearing on Doi Sutep, 720 m., *Kerr* 812. Lampun, Me Kaw, 300 m., *Winit* 1536. c. 360 m., mixed forest, *Winit* 416.

Distrib. Indo-China (*type*), Malay Peninsula, Sumatra (ex *Bakhuizen et Lam*).

(20) **C. lasiocephalum** *C. B. Clarke* in *F.B.I.* 594 (1885) ; Brand. Ind. Trees 507.

PAYAP. Chiengrai, Me Ta Mao, c. 550 m., secondary growth forest, *Winit* 784.

Distrib. Burma (*type*—Mishmi).

(21) **C. fragrans** (*Vent.*) *Willd.* Enum. Hort. Berol. 659 (1809) ; C. B. Clarke in *F.B.I.* 589, *in nota* ; K. and G. Mat. 826, *in nota* ; Lam Verb. 259 ; Bakh. Verb. 88 ; Ridl. F.M.P. 629, *in nota* ; P'ei Verb. 133 ; Dop in *F.I.C.* 857.

PAYAP. Lampun, Me Li, c. 320 m., near road, *Winit* 260. RACHASIMA. Korat, Kao Lem, waste ground, *Kerr* 9902. Lam Nang Rawng, *Suksakorn* 895. KRUNGTEP. Bangkok garden, cultivated, *Marcan* 2014.

Distrib. A native of China, imported into all tropical countries and cultivated there.

(22) **C. indicum** *O. Ktze.* Rev. Gen. 586 (1891) ; Bakh. Verb. 85 ; P'ei Verb. 125. *C. siphonanthus* (R. Br.) C. B. Clarke in F.B.I. 595 (1885) ; Brand. Ind. Trees 508 ; F.K.C. 173 ; Williams 432 ; K. and G. Mat. 839 ; Ridl. i. 156 ; Lam Verb. 306 ; Ridl. F.M.P. 628 ; Dop in F.I.C. 853.

PAYAP. Chiangmai, c. 300 m., banks of irrigation ditches, *Kerr* 2738, 393. PRACHINBURI. Sriracha, c. 6 m., *Mrs. D. J. Collins* 287. Pan Sadet, c. 120 m., *Mrs. D. J. Collins* 1312. Aran Pratet, *Put* 1985. AYUTHIA. Angtawng, *Put* 2539. KRUNGTEP. Bangkok, tidal, waste ground, *Kerr* 3904. *Lakshnakara* 428. *Marcan* 2033. RACHABURI. Rachaburi, c. 10 m., cultivated, or wild about cultivated ground, *Winit* 544. Bangtapan, *Put* 1394. Bangtapan Noi, *Keith* 172. PUKET. Kopah, *Haniff* 12612.

Distrib. India (*type*), Burma, S. China, French Indo-China (ex *F.I.C.*), Malaya.

“*Clerodendron calamitosum* Linn. (ex parte).” Hosseus in Bot. Centralbl. Beih. **28**, 2, 429 (1911).

NAKAWN SAWAN. Wang Chao, 100 m., *Hosseus* 84 (ex *Hosseus*). I have not seen this plant and am unable to say what it may be.

Vitex Linn.

Calyx subequally 5-toothed or truncate (Subgen: *Euagnus* Schauer) : Inflorescence terminal, penultimate axillary peduncles often added :

Leaves covered with a fine closely matted white tomentum below :

Leaves 1- to 3-foliolate :

Leaves 1- to 3-foliolate.....(1) *V. trifolia*

Leaves 1-foliolate.....(2) *V. trifolia* var. *ovata*

Leaves 3- to 5-foliolate ; panicle lax with long peduncled cymes or crowded with sessile cymules...(3) *V. Negundo*

Leaves glabrous or hairy beneath, but never with a fine closely matted white tomentum :

Cymes condensed in clusters along the panicle branches :

Under surface of the leaf hairy :

Petiole winged(4) *V. limoniifolia*

Petiole not winged :

Calyx teeth at most 0.5 mm. long, both the teeth and the upper half of the tube pubescent within ; leaf margin entire.....(5) *V. Pierrei*

Calyx teeth at least 0.75 mm. long, pubescent within, tube glabrous within ; leaf margin entire or faintly crenate-serrate.....(6) *V. canescens*

Under surface of leaf glabrous, nerves elevated.....
(7) *V. coriacea*

Cymes more lax :

Calyx at least 2 mm. deep, including teeth and tube :

Calyx at most 3 mm. deep including teeth and tube :

Leaves ovate to oblong-elliptic :

- Petiole up to 8 cm. long ; median leaflet at most 10 cm. long, petiolule of median leaflet at most 2 cm. long.....(8) *V. quinata*
- Petiole up to 12 cm. long ; median leaflet at least 15 cm. long, petiolule of median leaflet at least 2 cm. long.....(9) *V. heterophylla*
- Leaves obovate or oblong to obovate :
 Corolla villous within.....
 (10) *V. heterophylla* var. *undulata*
- Corolla glabrous within.....
 (11) *V. sumatrana* var. *urceolata*
- Calyx at least 4 mm. deep, including teeth and tube.....
 (12) *V. pubescens*
- Calyx at most 2 mm. deep, including teeth and tube.....
 (13) *V. siamica*
- Inflorescence axillary :
 Leaves 5- to 3-foliolate.....(14) *V. glabrata*
- Leaves 3-foliolate :
 Cymes longer than the petioles.....(15) *V. peduncularis*
- Cymes shorter than the petioles :
 Calyx lobes oblong-lanceolate, up to 10 mm. long ; bracts large.....(16) *V. longisepala*
- Calyx lobes short, acute, up to 0.5 mm. long ; bracts minute
 (17) *V. vestita*
- Calyx unequally 2-lipped, deeply 3-toothed ; inflorescence axillary,
 cymes shorter than the petioles (subgen. *Glossocalyx* C. B. Clarke)
 (18) *V. gamosepala*

(1) **V. trifolia** Linn. Sp. Pl. 638 (1753) ; C. B. Clarke in F.B.I. 583 ; Brand. Ind. Trees 504 ; F.K.C. 173 ; K. and G. Mat. 842 ; Ridl. i. 156 ; Craib 164 ; Lam Verb. 180 ; Ridl. F.M.P. 630 ; P'ei Verb. 99 ; Dop in F.I.C. 834. *V. Agnus-castus* Linn. var. *trifolia* (Linn.) Kurz For. Fl. 270 (1877).

PAYAP. Chiangmai, c. 330 m., scrub jungle, Kerr 1248. Chiangmai, 391. NAKAWN SAWAN. Raheng, Doi Tung Cha, c. 500 m., limestone rocks, Kerr 4602. CHANTABURI. Rayawng, Schmidt. Kaw Chang, Ban Dan, by beach, Rabil 55. KRUNGTEP. Bangkok, temple compound, cultivated, Marcan 2109. Marcan 1901. RACHABURI. Prachuap, Hua Hin, prostrate near sea-shore, Lakshnakara 78. Bangtapan, Keith (ex Ridl.). PUKET. Trang, Kaw Mu, Robinson 6461. Palau Tebun, Kasum river, Haniff et Nur 3584. Langkawi, Buran Bay (ex Ridl.).

Distrib. India (*type*), Ceylon, Burma, French Indo-China (ex F.I.C.), Philippines, Hainan, China, Japan, N. Australia.

(2) **V. trifolia** Linn. var. **ovata** (Thunb.) Makino in Bot. Mag. Tokio, 17, 192 (1903). *V. ovata* Thunb. Fl. Jap. 257 (1784). *V. trifolia* Linn. var. *unifoliolata* Schauert ; F.K.C. 173 ; Williams 431 ; Lam Verb. 182 ; P'ei Verb. 100 ; Dop in F.I.C. 835. *V. trifolia*

Linn. var. *repens* Ridl. F.M.P. 631 (1923). *V. repens* Blanco Fl. Filip. 513 (1837).

RACHABURI. Prachuap, Hua Hin, creeping along sandy ground by the sea, *Kerr* 16127. *Lakshnakara* 78. *Marcan* 2262. *Marcan* 332. Bangtapan Noi, *Keith* (ex *Ridl.*). NAKAWN SRITAMARAT. Songkla, sandy shore, *Bourke-Burrows*. Singora, *Annandale*.

Distrib. Indo-Malaya, Mauritius (*type*), Australia, Japan.

(3) **V. Negundo** Linn. Sp. Pl. 638 (1753); C. B. Clarke in F.B.I. 583; Brand. Ind. Trees 503; Williams 431; K. and G. Mat. 843; Lam Verb. 189; Ridl. F.M.P. 631; P'ei Verb. 101; Dop in F.I.C. 835.

NAKAWN SAWAN. Me Ping Rapids near Ban Na, c. 140 m., limestone rocks, *Kerr* 3657. KRUNGTEP. Bangkok, c. 5 m., cultivated, *Kerr* 4286. Temple gardens, cultivated, *Marcan* 263. *Zimmermann* 2. PUKET. Ranawng, Kaw Chang, edge of beach, *Kerr* 16627. Langkawi, *Curtis*. *Wilkinson* 20799. PATTANI. Tomo, Ban Rubi, c. 150 m., near village clearing, *Lakshnakara* 664.

Distrib. E. Africa, India (*type*), Ceylon, French Indo-China, Philippines, Hainan, China, Japan, W. Polynesia.

(4) **V. limoniifolia** Wall. ex Kurz For. Fl. 271 (1877); C. B. Clarke in F.B.I. 584; Brand. Ind. Trees 504; Williams 431; Craib 164; Dop in F.I.C. 822.

PAYAP. Me Ping, Doi Noi, c. 300 m., *Kerr* 2011. MAHARAT. Pre, c. 150–240 m., *Vanpruk* 184. NAKAWN SAWAN. Ban Takli, c. 25 m., open forest, *Marcan* 1102. Paknampo, c. 15–50 m., *Vanpruk* 1009. PRACHINBURI. Sriracha, c. 5 m., used for houseposts, *Mrs. D. J. Collins* 9. RACHABURI. Kanburi, Ta Salao, c. 50 m., open deciduous forest, *Kerr* 19488. Prachuap, Hua Hin, c. 18 m., *Marcan* 367, *Kiah* 24414.

Distrib. Burma (*type*—Prome Hills), Laos, Cambodia (ex F.I.C.).

(5) **V. Pierrei** Craib in Kew Bull. 367 (1915); Dop in F.I.C. 823.

MAHARAT. Pre, Rawng Kwang, c. 300 m., mixed forest, *Kerr* 4851. PRACHINBURI. Sriracha, c. 5 m., *Mrs. D. J. Collins* 72, 73 (*types*). Sriracha, Nawng Kaw forest, *Mrs. D. J. Collins* 706.

Distrib. CochinChina.

(6) **V. canescens** Kurz in Journ. As. Soc. Beng. 42, 2, 101 (1873) et For. Fl. 270; C. B. Clarke in F.B.I. 586; Brand. Ind. Trees 504; Craib 164; P'ei Verb. 98; Dop in F.I.C. 837.

PAYAP. Chiengmai, c. 300 m., *Kerr* 1705. Me Tang, c. 390 m. scrub jungle, *Winit* 34. Doi Sutep, c. 330 m., *Kerr* 1766. Lampun, Me Li, c. 390 m., deciduous forest, *Winit* 256. MAHARAT. Pre, c. 120–180 m., *Vanpruk* 143, 425. NAKAWN SAWAN. Kampengpet, c. 50 m., mixed deciduous forest, *Kerr* 5970. UDAWN. Nakawn Panom, Tat Panom, c. 200 m., scrub, *Kerr* 21408. RACHABURI. Kanburi, Wang Kanai, c. 50 m., deciduous forest, *Kerr* 12845. Kanburi, c. 100 m., *Marcan* 2170. NAKAWN SRITAMARAT. Kao

Ram, c. 300 m., *Smith* 761. Nakawn Sritamarat, Lam Saka, under 50 m., grown as support for pepper, *Kerr* 15382. Patalung, Sak, under 50 m., scrub, *Kerr* 19246.

Distrib. Indo-China (type—Prome), Yunnan.

(7) **V. coriacea** C. B. Clarke in F.B.I. 586 (1885); Brand. Ind. Trees 504; K. and G. Mat. 846; Lam Verb. 200; Ridl. F.M.P. 632.

PATTANI. Pattani, Bukit, c. 400 m., evergreen forest, *Kerr* 7100.

Distrib. Burma, Malay Peninsula (type—Malacca), Sumatra.

(8) **V. quinata** (Lour.) Williams in Bull. Herb. Boiss. sér. 2, 5, 431 (1905); P'ei Verb. 94, *pro parte*; Dop in F.I.C. 833. *V. heterophylla* Roxb.; Lam Verb. 187, *pro parte*. *Cornutia quinata* Lour. Fl. Cochinch. 387 (1790).

UDAWN. Udawn, Nawng Bua, c. 200 m., mixed deciduous forest, *Kerr* 8612. Muk Dahan, Pu Mano, c. 200 m., deciduous forest, *Kerr* 21441. UBON. Ubon, Warin, *Lakshnakara* 886. RACHASIMA. Lam Nang Rawng, *Suksakorn* 941. Korat, Ban Chum Seng, *Noe* 201. *Put* 2841. RACHABURI. Kanburi, Ta Salao, c. 50 m., bamboo forest, *Kerr* 19519. Kanburi, Hin Dat, *Put* 118. Kanburi, c. 30 m., mixed forest, *Winit* 566, 546. Rachaburi, Chawm Bung, c. 100 m., mixed forest, *Kerr* 10637. Prachuap, Pak Tawan, c. 20 m., evergreen forest, *Kerr* 20503. Prachuap, Hua Hin, c. 20 m., open forest, on rocky, granite hill, *Kerr* 16211. Pran, Ban Pak Tawan, 30 m., evergreen forest, *Marcan* 265.

Distrib. Annam, Indo-China, China (type—Canton).

(9) **V. heterophylla** Roxb. Hort. Beng. 46 (1814), *nomen tantum*, et Fl. Ind. 3, 75 (1832); C. B. Clarke in F.B.I. 585; Brand. Ind. Trees 504; K. and G. Mat. 848; Lam Verb. 187, *pro parte*; Ridl. F.M.P. 633. *V. quinata* Dop in F.I.C. 833, *pro parte*.

PAYAP. Chiangmai, c. 750–1300 m., evergreen forest, *Winit* 1373. *Kerr* 3209. NAKAWN SRITAMARAT. Hui Mut, *Kiah* 24403.

Distrib. Assam (type), Burma, Malaya, Philippines, China, Hainan, Formosa.

(10) **V. heterophylla** Roxb. var. **undulata** C. B. Clarke in F.B.I. 585 (1885). *V. heterophylla* Roxb.; Kurz For. Fl. 270 (1877). *V. heterophylla* Roxb. var. *typica* Lam Verb. 188 (1919), *pro parte*.

PAYAP. Chiangmai, Pang Tawn, *Put* 3803.

Distrib. Burma (type—Rangoon), Sumatra, Java, Philippines (ex Lam).

(11) **V. sumatrana** Miq. var. **urceolata** (C. B. Clarke) King et Gamble Mat. 849 (1909); Lam Verb. 187; Dop in F.I.C. 826. *V. urceolata* C. B. Clarke in F.B.I. 585 (1885); Ridl. F.M.P. 633; P'ei Verb. 97.

SURAT. Chumpawn, Bang Son, *Put* 1507. Siepyuan, *Put* 992.

Distrib. India, Malaya (type—Malacca), French Indo-China (ex F.I.C.).

(12) **V. pubescens** Vahl Symb. 3, 85 (1794) ; Kurz For. Fl. 271 ; C. B. Clarke in F.B.I. 585 ; Brand. Ind. Trees 504 ; F.K.C. 173 ; Williams 431 ; K. and G. Mat. 848 ; Ridl. i. 157 ; Craib 164 ; Ridl. ii. 58 ; Lam Verb. 183 ; Ridl. iv. 111 ; Ridl. F.M.P. 632 ; Dop in F.I.C. 824.

RACHASIMA. Korat, Bua Yai, *Put* 4273. CHANTABURI. Kaw Chang, jungle, 304. Kaw Chang, Salak Kawk, near sea-level, rocky slope, open deciduous forest, *Kerr* 6893. Kaw Chang, Lem Dan, open forest, *Rabil* 21. KRUNGTEP. Bangkok, c. 5 m., cultivated, *Kerr* 4455. PRACHINBURI. Sriracha, Nawng Kaw, evergreen forest, c. 30 m., *Kerr* 2039. Sriracha, *Mrs. D. J. Collins* 186. Sriracha forest, 16 miles inland, *Mrs. D. J. Collins* 167. RACHABURI. Prachuap, Hua Hin, c. 5 m., open scrub, *Marcan* 2281. Hui Yang, c. 50 m., edge of evergreen forest, *Kerr* 10885. SURAT. Chumpawn, Ban Pak Klawng, c. 20 m., evergreen forest, *Kerr* 11389. Kaw Samui, *Put* 834. Kaw Pangan, *Put* 1258. PUKET. Takuapa, Bangwan, c. 10 m., common in secondary growth, *Kerr* 17085. Trang, Kao Kao, Kuan Pra, timber used for making house-posts, *Rabil* 243. Trang, *Vanpruk* 607. Chawng, *Fox* 3828. Satul, Tung Wa, c. 20 m., savannah, *Kerr* 13875. Satul, *Ridley* 14938. NAKAWN SRITAMARAT. Songkla, Natawi, *Rabil* 80. Singora, *Annandale* 1667. PATTANI. Pattani, Tomo, c. 60 m., road-side, *Lakshnakara* 611. Betong, c. 200 m., scrub, *Kerr* 7491. SIAM. West Coast and Islands of Peninsular Siam, *Kloss* 6607.

Distrib. S. India (*type*), Burma, Assam, French Indo-China, Malaya.

(13) **V. siamica** Williams in Bull. Herb. Boiss. sér. 2, 5, 431 (1905) ; Williams 431 ; K. and G. Mat. 847 ; Ridl. i. 157 ; Lam Verb. 197 ; Ridl. F.M.P. 632 ; Dop in F.I.C. 829.

RACHABURI. Prachuap, Sam Roi Yawt, c. 500 m., rocky limestone hill, *Kerr* 10948. Bangtapan, *Put* 1378. SURAT. Chumpawn, Sapli, *Put* 1025. Langsuan, Tako, *Put* 1643. Surat, Ban Kawp Kep, c. 100 m., rocky limestone hill, *Kerr* 13175. Kantuli, *Put* 4149. PUKET. Pang-nga, Kaw Kalat, c. 10 m., rocky limestone ground, *Kerr* 17317. Krabi, Tambon, Kao Panom, c. 400 m., evergreen on limestone hill, *Kerr* 18775. Kaw Pipe-le, c. 200 m., limestone hill, *Kerr* 18923. Trang, Kao Kao, Kao Chom Lem, hill summit, *Rabil* 307. Langkawi (*type*). Langkawi, Dayang, Bunting and Kwah, *Fox* 12720. *Curtis* 1683. Terutao, Telok Apan, *Haniff et Nur* 7079. Selat Panchor, *Henderson* 21385. Kaw Rabana, off coast of Perlis, c. 60 m., limestone ridge top, *Henderson* 23094.

Distrib. Malay Peninsula.

Kerr 18923 and *Rabil* 307 have been referred to this species in spite of the fact that the ovary is distinctly pilose. In every other way the plants are so identical with this species that the writer does not feel justified in separating them.

(14) **V. glabrata** R. Br. Prodr. Fl. Nov. Holl. 512 (1810) ; C. B. Clarke in F.B.I. 588 ; Brand. Ind. Trees 505 ; K. and G. Mat. 852 ;

Lam Verb. 203 ; Ridl. F.M.P. 634 ; Dop in F.I.C. 840. *V. leucoxydon* Linn. ; Kurz For. Fl. 273 (1877).

PAYAP. Doi Sutep, c. 330 m., scrub jungle, *Kerr* 3369. NAKAWN SAWAN. Nakawn Sawan, Me Wong, c. 200 m., mixed deciduous forest, *Kerr* 6031. Muang Tak, Me Sawt, c. 20 m., mixed deciduous forest, *Kerr* 6156. UDAWN. Muk Dahan, Ban Won, dry evergreen forest, *Lakshnakara* 960. RACHASIMA. Korat, Ban Chum Seng, *Noe* 202. PRACHINBURI. Sriracha, Kaw Loy, c. 3 m., *Mrs. D. J. Collins* 1247. Nawng Kaw, 16 miles inland, *Mrs. D. J. Collins* 165. KRUNGTEP. Bangkok, Temple compound, probably cultivated, *Marcan* 2086. *Marcan* 1722. Hedgerow, *Kerr* 4391. SURAT. Langsuan, Tako, *Put* 1612. PUKET. Takuapa, c. 10 m., scrub, *Kerr* 17103. Krabi, Kaw Lanta, *Vanpruk* 725. Trang, Palien, under 50 m., scrub, *Kerr* 19121. Chum Het, c. 100 m., edge of evergreen forest, *Kerr* 15211. Trang, Kao Kao, *Rabil* 383. NAKAWN SRITAMARAT. Nakawn Sritamarat, Ban Tasan, under 50 m., scrub on river bank, *Kerr* 15370. PATTANI. Pattani, Kao Kalakiri, c. 50 m., evergreen forest, *Kerr* 7748.

Distrib. Indo-China, Malaya, New Guinea, North Australia (*type*).

(15) **V. peduncularis** Wall. ex Schauer in DC. Prodr. **11**, 687 (1847) ; C. B. Clarke in F.B.I. 587 ; Brand. Ind. Trees 505 ; Craib 164 ; Dop in F.I.C. 838.

PAYAP. Chiangmai, c. 300–400 m., mixed forest at foot of Doi Sutep and in deciduous forest on lower slopes of Doi Sutep, *Kerr* 572, 34, 34A. Doi Angka, c. 900 m., open evergreen forest, *Kerr* 5275. Lampun, Me Li, c. 570 m., deciduous forest, *Winit* 255. MAHARAT. Lampang, Me Sung, c. 450 m., *Vanpruk* 300. Pre, c. 150–240 m., *Vanpruk* 122. RACHASIMA. Korat, Ban Chum Seng, *Put* 2788. SURAT. Chumpawn, Bang Son, *Haniff et Nur* 4242.

Distrib. Indo-China (*type*—Moulmein).

(16) **V. longisepala** King et Gamble in Kew Bull. 112 (1908) et Mat. 853 ; Lam Verb. 202 ; Ridl. F.M.P. 634.

PATTANI. Bukit, c. 100 m., evergreen forest, *Kerr* 7113, *Kiah* 24275. Tomo, c. 210 m., scandent shrub, *Lakshnakara* 634.

Distrib. Malay Peninsula (*type*).

(17) **V. vestita** Wall. ex Kurz For. Fl. 272 (1877) ; C. B. Clarke in F.B.I. 587 ; Brand. Ind. Trees 505 ; F.K.C. 172 ; Williams 431 ; K. and G. Mat. 854 ; Lam Verb. 205 ; Ridl. F.M.P. 635 ; P'ei Verb. 112 ; Dop in F.I.C. 839.

PAYAP. Chiangmai, Me Tun, c. 900 m., edge of open marshy ground, *Kerr* 6238. SIAM. *Schmidt* 434.

Distrib. Burma, China, Laos (ex F.I.C.), Malaya (*type*—Penang).

(18) **V. gamosepala** Griff. Notul. **4**, 178 (1854), et Ic. Pl. Asiat. t. 448, fig. 2 (1854) ; C. B. Clarke in F.B.I. 588 ; K. and G. Mat. 855 ; Lam Verb. 209 ; Ridl. F.M.P. 635.

PATTANI. Pattani, Betong, c. 400 m., evergreen forest, *Kerr* 7440. Tomo, Ban Wo, c. 180 m., near stream in evergreen forest, *Lakshnakara* 695.

Distrib. Malay Peninsula (*type*—Malacca), Sumatra, Borneo (*ex Lam*).

Paravitex Fletcher

P. siamica *Fletcher* in *Kew Bull.* 74 (1937) fig. 2.

PRACHINBURI. Krabin, Aran Pratet, under 50 m., evergreen forest by stream, *Kerr* 19329. AYUTHIA. Angtawng, *Put* 2573. Bangpain, c. 6 m., waste ground, *Marcan* 1004. NAKAWN CHAISL. Supan, Dom Bang, c. 20 m., banks of river, *Kerr* 7002 (*type*).

TRIBE III. CARYOPTERIDEAE

Caryopteris Bunge

C. paniculata *C. B. Clarke* in *F.B.I.* 597 (1885) ; *Brand. Ind. Trees* 512 ; *Dop* in *F.I.C.* 885. *Clerodendrum gratum* *Kurz For. Fl.* 268, *non Wall.*

PAYAP. Doi Suteb, c. 1450 m., evergreen forest, *Kerr* 3137.

Distrib. Burma (*type*), Yunnan.

Garrettia Fletcher

G. siamensis *Fletcher* in *Kew Bull.* 71 (1937) fig. 1.

PAYAP. Doi Chiengdao, north of Ban Tam, c. 420 m., *Garrett* 988 (*type*).

Glossocarya Wall.

Under surface of leaf not glandular-punctate :

Leaves thinly tomentose below :

Capsule patently grey-hairy.....(1) *G. mollis*

Capsule grey-strigose.....(2) *G. longiflora*

Leaves glabrous below.....(3) *G. siamensis*

Under surface of leaf glandular-punctate :

Leaves crenate, mature at most 4 cm. long.....(4) *G. crenata*

Leaves entire, mature at least 5 cm. long.....(5) *G. premnoides*

(1) **G. mollis** *Wall ex Griff.* in *Calc. Journ. Nat. Hist.* 3, 366 (1843) ; *Kurz For. Fl.* 257 ; *C. B. Clarke* in *F.B.I.* 598 ; *Brand. Ind. Trees* 512 ; *Hoss.* 430 ; *Craib* 166 ; *Dop* in *F.I.C.* 886.

PAYAP. Me Ping Rapids, evergreen forest, *Kerr* 3061. NAKAWN SAWAN. Kao Ngaw, Ban Den, c. 100 m., climbing over limestone rocks, *Kerr* 4541. PITSANULOK. Petchabun, Prassals River, *Bourke*. UDAWN. Loi, Wang Sapung, c. 300 m., rocky limestone hill, *Kerr* 8770. AYUTHIA. Saraburi, Menam Sak, c. 40 m., along river bank, *Kerr* 4047. Muak Lek, c. 400 m., limestone hill-top, *Marcan* 1890. PRACHINBURI. Sriracha, by beach, *Mrs. D. J. Collins* 26, 39. KRUNGTEP. Menam, Bang-Ma-Lun, *Hosseus* 5. RACHABURI. Prachuap, Sam Roi Yawt, c. 50 m., scrub, *Kerr* 10963, rocky limestone hill, *Put* 236. SURAT. Chumpawn, Siepyuan, *Put* 996. Surat, Kantuli, *Put* 4127. PUKET.

Trang, *Robinson* 6406. NAKAWN SRITAMARAT. Patalung, Kao Hua Tek, c. 50 m., on limestone rocks, *Kerr* 19279.

Distrib. Burma (*type*—Sagaing), Annam (ex *F.I.C.*).

(2) **G. longiflora** *Fletcher* in *Kew Bull.* 205 (1938).

AYUTHIA. Saraburi, Keng Koi, *Lakshnakara* 284 (*type*). LOWER SIAM. Kao Kaw Sawan, c. 150 m., *Annandale* 1832.

(3) **G. siamensis** *Craib* in *Kew Bull.* 240 (1922); *Dop* in *F.I.C.* 888.

NAKAWN SAWAN. Chainat, *Put* 2673. AYUTHIA. Angtawng, *Put* 2575. KRUNGTEP. Bangkok, under 5 m., along canal, *Kerr* 4502 (*type*). RACHABURI. Kanburi, Ta Salao, c. 50 m., along river bank, *Kerr* 19530.

Distrib. French Indo-China (ex *F.I.C.*).

(4) **G. crenata** *Fletcher* in *Kew Bull.* 205 (1938).

UDAWN. Kawnken, near railway lines, *Lakshnakara* 1083 (*type*).

(5) **G. premnoides** *Ridl.* in *Journ. Str. Br. Roy. As. Soc.* 59, 157 (1911); *F.M.P.* 636.

RACHABURI. Kanburi, 30 m., growing gregariously on inundated banks of river, *Winit* 545. SURAT. Surat, Ta Kanawn, c. 50 m., on trees along river bank, *Kerr* 12312.

Distrib. Perlis (*type*).

Hymenopyramis *Wall.*

Utricle at least 2 cm. long, up to 4 cm. long :

Utricle almost glabrous; leaves with a thick short adpressed tomentum beneath and with numerous sessile amber glands almost completely hidden by the tomentum :

Leaves ovate to elliptic, up to 15 cm. long.....(1) *H. vesiculosa*

Leaves elliptic, up to 8 cm. long.....(2) *H. acuminata*

Utricle strongly pubescent; leaves with a thinner tomentum of longer hairs beneath and numerous sessile amber glands not hidden by the tomentum.....(3) *H. siamensis*

Utricle at most 2 cm. long :

Leaves with a short tomentum of white rather adpressed hairs below(4) *H. brachiata*

Leaves with a thick tomentum of longer white hairs below.....
(5) *H. cana*

(1) **H. vesiculosa** *Fletcher* in *Kew Bull.* 206 (1938).

MAHARAT. Pang Pui, c. 420 m., limestone rocks, *Kerr* 3626. NAKAWN SAWAN. Ban Dan, near Paknampo, c. 40 m., *Kerr* 3011 (*type*). Kawnken, Pu Wieng, c. 100 m., deciduous forest, *Kerr* 20657.

(2) **H. acuminata** *Fletcher* in *Kew Bull.* 206 (1938).

CHANTABURI. Krat, Kao Saming, under 50 m., evergreen forest, *Kerr* 17917 (*type*).

(3) **H. siamensis** Craib in Kew Bull. 154 (1912) ; Dop in F.I.C. 890 ; Craib 166.

RACHASIMA. Korat, Pak Chawng, c. 300 m., scrub, *Marcan* 1557. PRACHINBURI. Sriracha, Nawng Kaw, 30 m., in evergreen forest, *Kerr* 2087 (*type*). *Mrs. D. J. Collins* 620. Nawng Nam Kio, c. 120 m., *Mrs. D. J. Collins* 1855. Nawng Nok Takrun, c. 24 m., *Mrs. D. J. Collins* 1826.

Distrib. French Indo-China (ex *F.I.C.*).

(4) **H. brachiata** Wall. ex Kurz For. Fl. 258 (1877) ; C. B. Clarke in F.B.I. 598 ; Brand. Ind. Trees 505 ; Craib 166 ; Dop in F.I.C. 889.

MAHARAT. Pre, c. 120 m., *Vanpruk* 178. Me Ping, Ban Na, *Kerr* 2017A. Muang Hawt, *Kerr* 2017. UDAWN. Udawn, Nawng Han, *Lakshnakara* 1040. PRACHINBURI. Sriracha, *Mrs. D. J. Collins* 539, 248. Kao Chalak, near Sriracha, c. 12–120 m., *Mrs. D. J. Collins* 1263. All over the Sriracha forest, *Mrs. D. J. Collins* 1525. Sriracha, c. 20 m., hedgerow, *Marcan* 1364. AYUTHIA. Saraburi, Muak Lek, Kao Mak Mawk, *Noe* 131. RACHABURI. Nawng Ke, c. 12 m., forest, West Coast, Gulf of Siam, *Mrs. D. J. Collins* 1577. Kanburi, Kao Tawng, c. 50 m., bamboo forest, *Kerr* 19634. Hua Hin, *Marcan* 363. Hua Hin, Baw Tai, c. 2 m., *Marcan* 2485. Petchaburi, c. 100 m., deciduous forest, *Kerr* 5721. Petchaburi, Cha Am, *Lakshnakara*. Prachuap, Kao Tao, in scrub, by sea, *Kerr* 16146. Hui Yang, under 50 m., scrub, *Kerr* 10742. Pak Tawan, c. 150 m., light evergreen forest, *Kerr* 20515.

Distrib. N. & C. India, Burma (*type*), Cochinchina (ex *F.I.C.*).

(5) **H. cana** Craib in Kew Bull. 240 (1922) ; Dop in F.I.C. 890. PAYAP. Me Ping Rapids, Keng Soi, c. 400 m., on rocks, *Kerr* 4637 (*type*). UDAWN. Sakon Nakawn, *Lakshnakara* 1010.

Distrib. French Indo-China (ex *F.I.C.*).

TRIBE IV. SYMPHOREMEAE

Congea Roxb.

Involucre of 4 bracts, very rarely of 3 bracts ; bracts free or connate at the base to form a very shallow cup 0.75–1 mm. deep.....

(1) *C. villosa*

Involucre always of 3 bracts ; bracts free or connate at the base to form a cup up to 6 mm. deep :

Bracts free or connate at the base to form a very shallow cup 0.75–1 mm. deep :

Leaves round or more often cordate at the base ; involucre bracts elliptic ; calyx-teeth 1.8–2 mm. long.....

(2) *C. tomentosa*

Leaves often round but never cordate at the base ; involucre bracts oblong ; calyx teeth 3 mm. long.....

(3) *C. tomentosa* var. *azurea*

Bracts connate at the base forming a cup 4–6 mm. deep :

Involucral cup 4 mm. deep.....(4) *C. siamensis*

Involucral cup 6 mm. deep.....(5) *C. connata*

(1) *C. villosa* Wight Ic. t. 1479/1, fig. B. (1850) ; C. B. Clarke in F.B.I. 603 ; Brand. Ind. Trees 513 ; Bakh. Verb. 100, *pro parte*.

SURAT. Kao Meo, c. 50 m., bamboo forest, *Kerr* 12470. PUKET. Ranawng, Kaw Bangben, c. 50 m., evergreen forest, *Kerr* 16656. Puket, Katu, c. 50 m., evergreen forest, *Kerr* 17466. Kopah, *Haniff* 3858. NAKAWN SRITAMARAT. Songkla, Wang Yai, under 50 m., scrub, *Kerr* 14762. Kao Ram, c. 450 m., near stream, *Smith* 650.

Distrib. Burma (*type*).

(2) *C. tomentosa* Roxb. Cor. Pl. 3, 90, t. 293 (1819) ; Kurz For. Fl. 256 ; C. B. Clarke in F.B.I. 603 ; Brand. Ind. Trees 513 ; Ostenfeld 717 ; K. and G. Mat. 866 ; Hoss. 430 ; Craib 167 ; Ridl. i. 158 ; Lam Verb. 338 ; Ridl. iv. 111 ; Bakh. Verb. 100 ; Ridl. F.M.P. 640, *in nota* ; Dop in F.I.C. 911.

MAHARAT. Pre, c. 120–180 m., *Vanpruk* 163. NAKAWN SAWAN. Raheng, Wang Chao forest, *Lindhard*. Nakawn Sawan, Takli, *Put* 2101. c. 30 m., hill foot, forest, *Marcan* 1072. RACHASIMA. Korat, Pak Chawng, c. 300 m., scrub jungle, *Marcan* 1550. CHANTABURI. Chantabun, Makam, *Lakshnakara* 491. Krat, Baw Rai, c. 50 m., climbing in scrub, *Kerr* 9516. PRACHINBURI. Sriracha, near railway, c. 10 m., *Mrs. D. J. Collins* 359. Near Sriracha, c. 20 m., *Mrs. D. J. Collins* 2073. RACHABURI. Prachuap, Kan Kradai, *Put* 2283. Bangtapan, *Keith* (ex *Ridl.*). PUKET. Kopah, *Haniff* (ex *Ridl.*).

Distrib. Burma (*type*), French Indo-China (ex *F.I.C.*), Malay Peninsula.

(3) *C. tomentosa* Roxb. var. *azurea* (Wall. ex Wight) C. B. Clarke in F.B.I. 604 (1885) ; Brand. Ind. Trees 513 ; Williams 432 ; K. and G. Mat. 866, *in nota* ; Dop in F.I.C. 913. *C. villosa* Wight ; Bakh. Verb. 100 (1921) *pro parte*. *C. azurea* Wall. ; Hoss. 429.

PAYAP. Chiengmai plain, c. 300 m., on bushes in scrub jungle, *Kerr* 533. *Hosseus* 370. PITSANULOK. Petchabun, c. 50 m., mixed forest, *Kerr* 6368. CHANTABURI. 20 miles inland from Chantabun, *Murton* 85.

Distrib. Burma (*type*), Malay Peninsula. Cultivated in N. India.

(4) *C. siamensis* Fletcher in Kew Bull. 209 (1938).

PRACHINBURI. Krabin, Ban Keng, c. 20 m., savannah, *Kerr* 1792. RACHABURI. Kanburi, Sisawat, c. 50 m., climbing on bamboo along river bank, *Kerr* 10166 (*type*).

(5) *C. connata* Fletcher in Kew Bull. 208 (1938).

CHANTABURI. Krat, Kao Saming, under 50 m., evergree., forest, *Kerr* 17913 (*type*). Kaw Chang, Klawng Mayom, c. 50 mn evergreen forest by stream, *Kerr* 6810. East Coast, on high banks of stream below waterfall, *Mrs. D. J. Collins* 569. Kaw Chang, 306.

Symphorema Roxb.

S. involucratum Roxb. Cor. Pl. 2, 46, t. 186 (1819) et Fl. Ind. 2, 262; Kurz For. Fl. 254; C. B. Clarke in F.B.I. 599; Brand. Ind. Trees 514; Craib 167; Dop in F.I.C. 898.

PAYAP. Chawn Tawng, c. 270 m., mixed deciduous forest, *Kerr* 2932. Muang Fang, c. 700 m., mixed dry forest, *Kerr* 5234. MAHARAT. Lampang, Me Saloi, c. 200 m., mixed deciduous forest, *Winit* 1268. Pre, Hui Kammin, c. 18 m., *Kerr* 991.

Distrib. S. India (*type*), Burma.

Sphenodesme Jack

Corolla lobes narrowly lanceolate or oblong or obovate; anthers included in the corolla tube; style very short; leaves with branched hairs (Sect. I. BRACHYNEMA C. B. Clarke):

Calyx equally 5-toothed; corolla lobes obovate.....(1) *S. involucrata*

Calyx bilabiate; corolla lobes linear or narrowly oblong:

Corolla lobes at least 1 mm. broad:

Leaves orbicular, round or slightly cordate at the base; ovary non-glandular.....(2) *S. orbiculare*

Leaves ovate to slightly elliptic, obtuse or cuneate at the base; ovary glandular at the apex.....(3) *S. odorata*

Corolla lobes at most 1 mm. broad; leaves elliptic, cuneate or obtuse at the base.....(4) *S. microstylis*

Corolla lobes oblong; anthers exserted; style long, exserted; leaves glabrous or with straight jointed hairs (Sect. II. EUSPHENODESMA C. B. Clarke):

Cymes of 3 flowers:

Ovary glabrous; lateral nerves 4-5 pairs.....(5) *S. triflora*

Ovary hairy; lateral nerves 1-2 pairs.....(6) *S. mekongensis*

Cymes of 7 flowers:

Involucral bracts glabrous on both surfaces, except for small axillary tufts below; calyx glabrous without except for a few scattered hairs, 7-9 mm. deep, including the teeth and the tube; leaves glabrous.....(7) *S. pentandra*

Involucral bracts crisply tomentose on both surfaces; calyx tomentose without, 5-7 mm. deep, including teeth and tube; leaves markedly tomentose below.....(8) *S. mollis*

(1) **S. involucrata** (Presl) Robinson in Proc. Am. Acad, 51, 531 (1916). *S. unguiculata* (Schauer) C. B. Clarke in F.B.I. 601 (1885); Brand. Ind. Trees 513; Dop in F.I.C. 900. *Symphorema unguiculatum* Kurz For. Fl. 255 (1877). *Vitex involucratus* Presl Bot. Bemerk. 148 (1844).

MAHARAT. Lampang, Me Luang, c. 260 m., evergreen forest, *Winit* 1586. UDAWN. Loi Sitan, c. 200 m., evergreen forest, *Kerr* 20030. PRACHINBURI. Krabin, Tungpo, c. 100 m., evergreen forest, *Kerr* 9812.

Distrib. Burma (*type*), Hainan, Indo-China.

(2) **S. orbicularis** *Fletcher* in Kew Bull. 208 (1938).

PUKET. Ranawng, Lamlieng, c. 10 m., climbing in scrub, *Kerr* 16411 (*type*).

(3) **S. odorata** *Fletcher* in Kew Bull. 207 (1938).

MAHARAT. Lampang, Me Salop, 190 m., *Winit* 1264. PUKET. Ranawng, Kao Talu, c. 50 m., scrub, *Kerr* 11815 (*type*).

(4) **S. microstylis** *C. B. Clarke* in F.B.I. 600 (1885) ; Brand. Ind. Trees 513 ; F.K.C. 175 ; Williams 432 ; Ridl. iv. 111 ; Ridl. F.M.P. 638. *S. ferruginea* Briquet in Engl. und Prantl Pflanzenf. iv. 3a, 181 (1894) ; K. and G. Mat. 861 (1909) ; Ridl. i. 157 ; Dop in F.I.C. 899.

MAHARAT. Nan, Doi Wao, c. 900 m., *Kerr* 2437. UBON. Ubon, Kemarat, c. 100 m., mixed deciduous forest, *Kerr* 8376. CHANTABURI. 20 miles inland from Chantabun, *Murton* 62. Kaw Chang, Salak Kawk, *Rabil* 28. Kaw Chang, Klawng Mayom, scrub near sea, *Kerr* 6866. PRACHINBURI. Sriracha, c. 6–12 m., *Mrs. D. J. Collins* 329, 329A, 360. Sriracha forest, on the way from Ban Dan to Hot Springs, *Mrs. D. J. Collins* 585. RACHABURI. Kanburi, Wangka, c. 200 m., bamboo forest, *Kerr* 10305. SURAT. Surat, Kao Wong, c. 100 m., scrub, *Kerr* 18271. PUKET. Langkawi, Terutao, *Curtis* (ex *Ridl.*). NAKAWN SRITAMARAT. Nakawn Sritamarat, Ban Natawn, under 50 m., savannah, *Kerr* 15633.

Distrib. Burma (*type*), Malay Peninsula, Cambodia, Cochinchina (ex *F.I.C.*).

(5) **S. triflora** *Wight* Ic. t. 1478 (1850) ; C. B. Clarke in F.B.I. 601 ; K. and G. Mat. 863 ; Ridl. i. 158 ; Lam Verb. 332 ; Ridl. F.M.P. 638.

PUKET. Langkawi, *Fox* (ex *Ridl.*). PATTANI. Betong, c. 400 m., evergreen forest, *Kerr* 7681.

Distrib. Malay Peninsula (*type*—Malacca), Sumatra (ex *Ridl.*).

(6) **S. mekongensis** *Dop* in Bull. Soc. Bot. France, 1914, 61, 318 (1915), ex descr., et F.I.C. 901 (1936).

MAHARAT. Lampang, Me Sui, c. 100 m., moist forest, *Winit* 1961. UDAWN. Loi, Pu Tong, c. 900 m., evergreen forest, *Kerr* 8825.

Distrib. Laos (*type*).

(7) **S. pentandra** *Jack* in Mal. Misc. 1, i, 19 (1820) ; C. B. Clarke in F.B.I. 602 ; Brand. Ind. Trees 513 ; F.K.C. viii. 174 ; Williams 432 ; K. and G. Mat. 863 ; Craib 167 ; Ridl. i. 158 ; Lam Verb. 335 ; Ridl. iv. 111 ; Ridl. F.M.P. 639 ; P'ei Verb. 183 ; Dop in F.I.C. 904. *Symphorema Jackianum* Kurz For. Fl. 255 (1877).

PAYAP. Doi Sutep, c. 750 m., evergreen forest by stream, *Kerr* 1741. Chiangdao, Me Ping, c. 390 m., evergreen forest, *Kerr* 1059. PITSANULOK. Nakawn Tai, c. 200 m., mixed deciduous forest, *Kerr* 5849. PRACHINBURI. Krabin, Bupram, c. 300 m., evergreen forest, *Kerr* 9832. Sriracha, Nawng Kaw, c. 70 m., evergreen forest, *Marcan* 1204. Sriracha, near railway line, c. 10 m., *Mrs. D. J. Collins* 358. Sriracha to Nawng Yai Bu, *Mrs. D. J. Collins* 632.

Near Sriracha, c. 5–10 m., *Mrs. D. J. Collins* 1416, 1388, 1969. RACHABURI. Bangtapan Noi, *Keith* (ex *Ridl.*). SURAT. Chumpawn, Ta Ngaw, c. 50 m., evergreen forest, *Kerr* 11603. Surat, Kaw Samui, c. 200 m., by stream, *Kerr* 12583. PUKET. Ranawng, Kraburi, c. 10 m., scrub, *Kerr* 16376. Ranawng, c. 10 m., scrub, *Kam La in Herb.* *Kerr* 16535. Ranawng, Kao Talu, c. 50 m., scrub, *Kerr* 11816. Trang, near road, c. 10 m., *Vanpruk* 848. Satul, Kuan Po, c. 20 m., scrub, *Kerr* 13825. Satul, Adang, by beach, *Kerr* 14070. Satul, Bukit Rajah Wang, *Ridley* 14937. Langkawi, Kwah, *Curtis* (ex *Ridl.*). Langkawi, *Curtis* 2522. *Haniff* 15478. *Ridley et Curtis* 8320. *Haniff et Nur* 7070. NAKAWN SRITAMARAT. Nakawn Sritamarat, Lam Saka, under 50 m., scrub, *Kerr* 15396. Songkla, Kaw Suan Toon, *Annandale*. Kao Ram, c. 360 m., 607. West Coast and Islands of Peninsular Siam, *Kloss* 7038, 6707.

Distrib. Burma, French Indo-China, Malay Peninsula (*type*—Penang), Borneo, Hainan, China.

(8) ***S. mollis*** *Craib* in *Kew Bull.* 154 (1912); *Craib* 167; *Dop* in *F.I.C.* 904.

RACHASIMA. Korat, Pak Chawng, c. 300 m., scrub jungle, *Marcan* 1590. CHANTABURI. Chantabun, Tap Sai, c. 200 m., scrub, *Kerr* 9688. PRACHINBURI. Sriracha, Nawng Kaw, c. 30 m., evergreen forest, *Kerr* 2075 (*type*). Sriracha, *Put* 457. KRUNGTEP. Bangkok, cultivated, *Kerr* 11035. AYUTHIA. Saraburi, Muak Lek, c. 200 m., evergreen forest, *Kerr* 9117. Saraburi, Ban Nawng Bua, *Put* 1107. Saraburi, Keng Koi, c. 50 m., climbing on trees along river bank, *Kerr* 7971. RACHABURI. Petchaburi, c. 10 m., scrub on limestone hill, *Kerr* 11063. Petchaburi, Bo Tai, c. 100 m., forest on granite hill, *Marcan* 2739. Petchaburi, c. 50 m., base of hill, *Marcan* 552. Prachuap, Hua Hin, near sea-level, scrub, *Kerr* 13436. *Marcan* 2227. Prachuap, Sam Roi Yawt, under 50 m., scrub, *Kerr* 10966.

TRIBE V. AVICENNIEAE

***Avicennia* Linn.**

Style and stigma at most 1 mm. long, scarcely separable and forming a conical tip to the ovary; leaves grey or very pale tawny below, ovate to lanceolate:

Fruit beaked; flowers in short distichous spikes; leaves elliptic to lanceolate.....(1) *A. alba*

Fruit not beaked; flowers in small heads; leaves ovate to elliptic(2) *A. sphaerocarpa*

Style at least 2.5 mm. long; leaves light to dark tawny below, obovate(3) *A. officinalis*

(1) ***A. alba*** *Blume* *Bijdr.* 821 (1826); *Brand. Ind. Trees* 515; *K. and G. Mat.* 868; *Ridl. F.M.P.* 641. *A. officinalis* (Linn.) *Kurz For. Fl.* 275 (1877); *Lam Verb.* 340, *pro parte*. *A. officinalis*

Linn. var. *alba* (Bl.) C. B. Clarke in F.B.I. 604 (1885). *A. marina* Forsk. var. *alba* (Bl.) Bakh. Verb. 207 (1921) ; Dop in F.I.C. 894.

CHANTABURI. Chantabun, Klung, mangrove forests, *Kerr* 17948. KRUNGTEP. Paknam, tidal swamp forest near sea, *Kerr* 8920. NAKAWN CHAISL. Tachin, growing below high tide level, *Kerr* 9163, tidal forest, *Kerr* 4027. RACHABURI. Prachuap, Sam Roi Yawt, low lying ground near sea, *Kerr* 10969. SURAT. Langsuan, Tako, *Put* 1721. PUKET. Ranawng, Kaw Chang, on sandy flats flooded at high tide, *Kerr* 16581. Trang, Kaw Libang, on shore between high and low tide marks, *Kerr* 19070. Satul, Tanjong Po, forming a nearly pure open formation below high tide mark, *Kerr* 14236.

Distrib. India, Cochinchina, Malay Archipelago (*type*) to N. Australia.

(2) **A. sphaerocarpa** *Stapf ex Ridley* in Journ. Fed. Mal. States Mus. **10**, 151 (1920) et F.M.P. 642.

PRACHINBURI. Sriracha, below high water mark, *Kerr* 2095. Lemfam Island, near Sriracha, almost submerged at high tide, *Mrs. D. J. Collins* 1028. NAKAWN CHAISL. Tachin, just above high tide level, *Kerr* 9162. *Marcan* 855. RACHABURI. Prachuap, Sam Roi Yawt, low-lying ground near sea, *Kerr* 11017. SURAT. Kaw Samui, Ban Nua Put, on tidal mud, *Kerr* 15702. PUKET. Krabi, Lanta, in mangroves, *Kerr* 18861.

Distrib. Malay Peninsula (*type*-Penang), Philippines, China.

(3) **A. officinalis** Linn. Sp. Pl. 110 (1753) ; C. B. Clarke in F.B.I. 604 ; Brand. Ind. Trees 514 ; F.K.C. 175 ; Williams 432 ; K. and G. Mat. 867 ; Craib 168 ; Ridl. i. 158 ; Lam Verb. 340, *pro parte* ; Bakh. Verb. 214 ; Dop in F.I.C. 895. *A. tomentosa* Roxb. ; Kurz For. Fl. 276 (1877).

PUKET. Krabi, Ao Luk, mangrove forest, *Kerr* 18593, 17474. Trang, *Bourke*. Satul (*ex Ridl.*).

Distrib. Coasts of India (*type*), Ceylon, Burma, Cochinchina, Malay Peninsula, Java, eastwards to the Pacific.

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LX—CONTRIBUTIONS TO THE FLORA OF SIAM. ADDITAMENTUM L.*

Meladerma Kerr, gen. nov. [Asclepiadaceae–Periploceae]; ab affini *Atherandra* Dcne. inflorescentia foliis multo brevior, lobis corollae oblongo-ovatis nec lineari-lanceolatis, translato brevius stipitato differt.

Suffrutices volubiles. *Folia* opposita. *Inflorescentia* pauciflora, saepius axillaris, foliis multo brevior, a basi 2-fida vel breviter pedunculata, ramis bracteis parvis vestitis. *Alabastrum* ovoideum, puberulum, corollae lobis dextrorsum se tegentibus. *Corolla* rotata, alte 5-fida, viridula; tubus brevissimus, fauce incrassatus, squamulis 5 obtusis staminibus interpositis instructus; lobi oblongo-ovati, patentes vel reflexi. *Coronae* segmenta simplicia, filiformia, inferne parum dilatata, basi filamentorum affixa. *Stamina* glabra, exserta, fauce corollae affixa; filamenta brevia, distincta; antherae circa stigma connatae, apice appendicibus triangularibus conniventibus; pollen granulosum, translatori breviter stipitato applicitum. *Carpella* basi saepius in receptaculo leviter immersa. *Folliculi* cylindrici, late divaricati. *Semina* comosa.

Species tres, insulae Langkawi et regni Siamici incolae.

Meladerma puberulum Kerr, described below, is the type species of this proposed genus. The squamulae noted in the description are slight projections of the thickened ring at the throat of the corolla.

* Continued from K.B. 1938, 209.



Meladerma puberulum Kerr. 1, flowering branch, nat. size; 2, flower, $\times 4$; 3, calyx, $\times 12$; 4, part of calyx from within, $\times 16$; 5, corolla lobe from within, $\times 8$; 6, corolla lobe from within, $\times 8$; 7, part of corolla and stamens (from bud) from within, $\times 12$; 8, stamen and corona segment, $\times 16$; 9, stigmatic head and translators, $\times 16$; 10, translator, $\times 24$; 11, fruiting branch, nat. size; 12, seed, $\times 2$.

It seems probable that all three species have their habitat on rocky limestone hills. Such a habitat is mentioned for two of the species, while the third is recorded only from localities known to have such hills.

The generic name refers to the dark bark of the three species so far known.

Meladerma deciduum Kerr ; a congeneribus habitu deciduo, inflorescentia dense tomentosa distinguendum.

Suffrutex volubilis, ramulis siccitate irregulariter corrugatis cortice nigro-brunneo paucilenticellato obtectis. *Folia* non visa. *Inflorescentia* ut videtur terminalis, omnino dense cinereo-tomentosa, pauciflora, usque circiter 1 cm. longa, bracteis ovatis subacutis circiter 2 mm. longis, pedicellis 5–8 mm. longis. *Calyx* 5-partitus, extus dense cinereo-tomentosus, lobis triangularibus circiter 2·5 mm. longis intus basi glandulis minutis instructis. *Corolla* rotata, viridula ; tubus brevissimus, circiter 0·5 mm. longus ; lobi oblongo-ovati, apice parum emarginati, extus dense cinereo-pubescentes, intus glabri, circiter 3·75 mm. longi, 1·5 mm. lati. *Coronae* segmenta filiformia, longitudine variabilia, saepius antheris paulo breviora, interdum filamentis vix aequilonga. *Stamina* circiter 1·5 mm. longa. *Translatores* 0·75 mm. longi, breviter stipitati. *Stylus* perbrevis, stigmatis capite convexo, carpellis basi in receptaculo leviter immersis multiovulatis. *Folliculi* ignoti.

Chiengmai, Ban Pa Sak, 540 m., on rocky limestone hill, Kerr 2834.

Meladerma insularum (King et Gamble) Kerr, comb. nov. *Gymnanthera insularum* King et Gamble in Journ. As. Soc. Beng. **74**, pt. 2, 514 (1907).

King and Gamble referred this species to *Gymnanthera*, from which, however, it differs in several important points, notably in its rotate corolla and filiform corona segments. It is clearly congeneric with the two species here described under *Meladerma*. The authors describe the corona segments of *Gymnanthera insularum* as bifid. In Herb. Kew. there is a drawing, apparently by Gamble, of the floral parts of *Curtis* 3684, the type of *Gymnanthera insularum*, which shows two isolated coronal segments with a very short dorsal branch. In the flowers examined by the writer the corona segments appeared to be simply filiform : no dorsal branch was detected.

Meladerma puberulum Kerr ; a *M. insularum* (King et Gamble) Kerr foliis late ellipticis puberulis differt.

Suffrutex volubilis, innovationibus puberulis, ramulis gracilibus longitudinaliter striatis cortice nigro-brunneo paucilenticellato obtectis. *Folia* late elliptica, basi cuneata, apice rotundata, leviter apiculata, ad 5·2 cm. longa et 4 cm. lata, chartacea, siccitate supra nigro-brunnea, subtus olivacea, supra costa nervisque minute puberula, subtus omnino dense puberula, costa supra parum impressa subtus cum nervis lateralibus prominente, nervis lateralibus

6-9-paribus prope marginem arcuatis anastomosantibusque, rete venularum supra impresso subtus inconspicuo; petiolus gracilis, supra convexus, 1.6-2.2 cm. longus, minute puberulus. *Inflorescentia* puberula, axillaris, petiolo multo brevior, ad 1 cm. longa, e basi bifida vel brevissime pedunculata, pauciflora, ramis bracteis parvis vestitis, pedicellis puberulis 5 mm. longis. *Calyx* suburceolatus, 5-lobatus, minute puberulus, lobis triangularibus circiter 0.75 mm. longis, intus basi glandulis minutis instructis. *Corollae* tubus circiter 1.5 mm. longus; lobi oblongo-ovati, extus sparse minuteque puberuli, circiter 3 mm. longi et 1.5 mm. lati. *Coronae* segmenta filiformia, staminibus saepius aequilonga, interdum breviora. *Stamina* circiter 1.5 mm. longa, siccitate appendicibus triangularibus nigro-brunneis. *Translatores* breviter stipitati, circiter 0.5 mm. longi. *Stylus* perbrevis, stigmatis capite convexo. *Folliculi* angulo 180° divaricati, cylindrici, apicem versus sensim attenuati, 7.5 cm. longi; semina leviter tuberculata, 6 mm. longa, coma alba 11 mm. longa.

Prachuap, rocky limestone hill, *Put* 285.

Periploca purpurea Kerr [Asclepiadaceae-Periploceae]; a *P. calophylla* (Wight) Falconer, cui affinis, floribus majoribus, petalis glabris distinguenda.

Suffrutex volubilis, glaber, ramulis gracilibus leviter striatis. *Folia* lineari-lanceolata, basi cuneata, apice longe et anguste acuminata, margine plana, ad 7 cm. longa et 0.8 cm. lata, coriacea, supra nitida, subtus opaca et pallidiora, costa subtus supraque prominenti, nervis lateralibus numerosis subparallelis cum nervo intramarginali junctis; petiolus 2-3 mm. longus, supra alte canaliculatus. *Cymae* glabrae, terminales, raro axillares, laxae 2-4-florae, foliis multo breviores; bractee subulatae, 1-2 mm. longae; pedicelli tenues, 5-8 mm. longi, apice bracteolis binis minutis instructi. *Calyx* 5-partitus, glaber, intus glandulis parvis 5 instructus, lobis triangularibus acutis 2 mm. longis. *Corolla* rotata, glabra, saturate purpurea; tubus perbrevis, circiter 1 mm. longus; lobi anguste lanceolati, apice attenuati, acuti, 13 mm. longi, prope basin 2.5 mm. lati. *Coronae* segmenta filiformia, puberula, ad 3 mm. longa. *Stamina* circiter 1 mm. longa; filamenta distincta, perbrevia; antherae dorso pilosae, apice in appendicem barbatam productae. *Ovarium* cum stigmate circiter 1.25 mm. altum, stigmatibus capite convexo. *Folliculi* ignoti.

Doi Chiangdao, circiter 1,600 m., open evergreen forest, *Kerr* 5576.

Secamone siamica Kerr [Asclepiadaceae-Secamoneae]; species *S. emeticae* (Retz.) R. Br. affinis, foliis pro rata latioribus subtus puberulis, stigmatis capite rotundato differt.

Suffrutex volubilis, ramis gracilibus ferrugineo-pubescentibus tardius glabrescentibus leviter striatis. *Folia* lanceolata vel elliptica, basi subacute cuneata, apice acuta et minute apiculata,

ad 3.6 cm. longa, 1.7 cm. lata, chartacea, siccitate supra fusco-viridia, subtus pallidiora, supra minute parceque puberula praesertim ad costam, infra ubique minute breviterque puberula, costa subtus prominula supra plana vel leviter impressa, nervis lateralibus 4-6-paribus subtus prominulis supra inconspicuis; petiolus 2-2.5 mm. longus, ferrugineo-pubescens, supra canaliculatus. *Inflorescentia* axillaris, interdum terminalis, cymosa, divaricata, omnino sat dense ferrugineo-pubescens, pedunculo communi 0.4-1.5 cm. longo incluso 1.5-2.5 cm. longa; bractee ovatae, circiter 0.75 mm. longae; pedicelli ad 2.5 mm. longi. *Calyx* 5-partitus, lobis oblongo-lanceolatis obtusis eglandulosis, extus praesertim basin versus sparse puberulis, 0.75 mm. longis. *Corolla* pallide viridis, 5-partita, glabra; tubus brevissimus; lobi oblongo-elliptici, apice minute emarginati, 2 mm. longi, 1 mm. lati, lobus quisque basin versus callis binis minute papillois instructus. *Gynostegium* circiter 1.5 mm. altum; coronae processus antherae dorso affixi, gynostegio breviores; stigmatis caput rotundatum, minute papillosum, ultra stamina manifeste exsertum. *Folliculi* ignoti.

Muang Pai, circiter 600 m., in scrub, *Kerr* 5504.

Toxocarpus lagenifer *Kerr* [Asclepiadaceae-Secamoneae]; a *T. Griffithii* Dcne., cui affinis, petiolis longioribus inflorescentia ampliore differt.

Suffrutex volubilis, ramulis glabris subquadratis, cortice lenticellis parvis prominulis sat dense obsito vestitis. *Folia* vulgo oblanceolata, interdum elliptica vel oblongo-elliptica, basi cuneata vel rotundata, apice subito acuminata et minute mucronata, ad 9.5 cm. longa, 5 cm. lata, chartacea, glabra, costa supra impressa subtus prominente, nervis lateralibus 6-7-paribus patentibus leviter arcuatis, supra leviter impressis subtus prominulis; petiolus gracilis, 1.4-2 cm. longus, supra anguste canaliculatus, juventute minute puberulus, apice ad laminae basin glandulis minutis instructus. *Inflorescentia* axillaris, cymosa, e basi divaricata, multiflora, omnino minute brunneo-puberula, ad 4 cm. longa et lata; bractee oblongae, circiter 0.75 mm. longae; pedicelli graciles, circiter 4 mm. longi, apicem versus bracteolis binis minutis instructi. *Calyx* alte 5-partitus, extus minute puberulus, intus basi glandulis 5 minutis praeditus, lobis ovatis ciliatis apice obtusis 1.5 mm. longis. *Corollae* tubus 1 mm. longus, intus velutinus; lobi lineares, obtusi, 4.5 mm. longi, 1 mm. lati, intus basin versus velutini. *Gynostegium* 2.5 mm. altum; coronae segmenta subulata, dorso antherae affixa, antheras excedentia; antherae appendix brevis, erosa; stigmatis caput lageniforme, apice minute bilobum, circiter 1.5 mm. longum. *Folliculi* late divaricati, lignosi, e basi sensim attenuati, circiter 14.5 cm. longi; semina complanata, 12 mm. longa, 4.5 mm. lata, apice coma alba 5 cm. longa praedita.

Prachuap, Kan Kradai, *Put* 2292.

Toxocarpus oblanceolatus Kerr [Asclepiadaceae-Secamoneae]; *T. Elmeri* Merrill valde affinis, foliis tenuioribus oblanceolatis basi subcuneatis distinguitur.

Suffrutex volubilis, ramulis gracilibus juventute brunneo-puberulis striatis, internodiis sat longis. *Folia* oblanceolata vel obovata, basi subcuneata, minute auriculata, apice breviter acuminata, ad 12 cm. longa, 5 cm. lata, coriacea, siccitate supra pallide cinerea, nitida, subtus pallidiora, opaca, glabra nisi costa utrinque tenuiter puberula, costa supra impressa subtus prominente, nervis lateralibus 5-6-paribus patentibus, a margine sat distanter arcuatis anastomosantibusque, supra inconspicuis subtus cum rete venularum prominulis; petiolus 0.6-1 cm. longus, striatus, puberulus, apice ad laminae junctionem glandulis minutis praeditus. *Inflorescentia* axillaris, cymosa, e basi divaricata vel breviter pedunculata, ad 3 cm. longa et lata, omnino brunneo-puberula; bracteae oblongae, circiter 2 mm. longae; pedicelli perbreves, ad 1.5 mm. longi. *Calyx* alte 5-partitus, extus appresse brunneo-puberulus, intus glandulis 5 minutis praeditus, lobis ovatis apice rotundatis 1.5 mm. longis. *Corolla* alba; tubus 2.5-3 mm. longus, intus glandulo-velutinus; lobi lineares, apice obtusi, circiter 5 mm. longi. *Gynostegium* 2-3 mm. longum; coronae segmenta externa late lanceolata, antheras paulo excedentia; segmenta interna tenuia, ligulata, antheris aequilonga; stigmatis caput subcylindricum vel basin versus parum incrassatum, apice integrum vel minute bilobum, circiter 1.3 mm. longum, stamina multum excedens. *Folliculi* ignoti.

Sukotai, Kao Luang, circiter 500 m., evergreen forest, *Kerr* 5914.

Toxocarpus ovatus Kerr [Asclepiadaceae-Secamoneae]; species *T. Griffithii* affinis, foliis ovatis, inflorescentia multiflora folia saepius excedente differt.

Suffrutex volubilis, ramulis gracilibus juventute brunneo-pubescentibus demum glabrescentibus, plus minusve striatis, cortice lenticellis ovalibus parum prominulis ornato vestitis. *Folia* ovata vel oblongo-ovata, basi rotundata, rarius obtuse cuneata, apice leviter acuminata, acuta, chartacea, 4.6-7 cm. longa, 1.8-3.2 cm. lata, supra nitida, glabra nisi secus costam puberula, subtus opaca, glabra vel secus costam puberula, costa supra impressa subtus prominente, nervis lateralibus 5-6-paribus supra inconspicuis subtus prominulis. *Inflorescentia* extra-axillaris, cymosa, valde ramosa lateque divaricata, saepius folia excedens, omnino brunneo-puberula; bracteae ovatae, acutae, circiter 1.5 mm. longae; pedicelli 1-1.5 mm. longi. *Calyx* alte 5-partitus, extus appresse brunneo-pubescentis, intus basi glandulis minutis praeditus; lobi ovati, obtusi, 1.5 mm. longi. *Corollae* tubus intus fauce pilis erectis rigidulis rubro-brunneis in fasciculis 5 Y-formibus dispositis etiam basin loborum attingentibus ornatus, circiter 1 mm. longus; lobi lineares, apice obtusi, 4 mm. longi, 0.75 mm. lati. *Gynostegium* 2-2.5 mm. altum; coronae segmenta late hastata,

antheras excedentia, intus ligulo membranaceo segmento longiore praedita; stigmatis caput fusiforme, apice integrum, circiter 1.25 mm. longum. *Folliculi* ignoti.

Nakawn Sritamarat, Kua Koi, 55 m., *Vanpruk* 707.

Gymnemopsis calcicola *Kerr* [Asclepiadaceae–Marsdenieae]; ab affini *G. Pierrei* Cost. foliis apice acutis pro rata angustioribus inter alia distinguenda.

Frutex volubilis, ramulis teretibus gracilibus crispatis pubescentibus demum glabrescentibus. *Folia* lanceolata, basi obtuse cuneata vel rotundata, apice acuta minuteque mucronata, rarius leviter acuminata, margine parum revoluta, 2.8–4.5 cm. longa, 0.9–1.3 cm. lata, chartacea, supra olivacea, opaca, subtus pallidiora, ad marginem et secus costam utrinque tenuiter pubescentia, costa supra impressa subtus prominente, nervis lateralibus 3–4-paribus, paribus imis saepius e basi ortis, acute ascendentibus supra parum impressis subtus prominulis; petiolus 2–4 mm. longus, pubescens. *Inflorescentia* axillaris, 2–4-flora, subsessilis vel breviter pedunculata; bracteae saepius subfoliaceae, lanceolatae, pubescentes, ad 5 mm. longae; pedicelli 1.5–3 mm. longi, pubescentes. *Calyx* alte 5-partitus, extus pubescens, intus basi glandulis quinque-paribus praeditus, lobis ellipticis apice obtusis 2.25 mm. longis. *Corolla* late campanulata, 5-lobata, rosea, extus glabra; tubus circiter 2.5 mm. longus, fauce pilis demissis instructus; lobi obtusi, circiter 2.5 mm. longi et lati, basi pilis paucis inspersi. *Coronae squamae* 5, fauci tubi adnatae, apice liberae et ultra sinus exsertae, pilis longis demissis copiose indutae. *Gynostegium* circiter 2 mm. altum, basi parum contractum, apice leviter convexum; corpuscula ab externa parte conspicua, apice stigmatis caput paulo excedentia, basi subhastata; pollinia oblongo-ovata, corpusculis breviora, pediculis subaequilonga; stigmatis caput pentagonale, vertice parum convexum. *Folliculi* ignoti.

Ratburi, circiter 200 m., climbing over bushes on limestone hill, *Kerr* 9044.

Tylophora riparia *Kerr* [Asclepiadaceae–Marsdenieae]; *T. tenui* Blume affinis, floribus majoribus, corollae lobis pro rata longioribus differt.

Frutex volubilis; ramuli graciles, teretes, striati, juventute crispatis puberuli, demum glabrescentes. *Folia* oblongo-ovata vel ovata, basi leviter cordata interdum rotundata, apice rotundata et mucronata, papyracea, 1.6–3.6 cm. longa, 1–2.2 cm. lata, supra secus costam nervosque laterales breviter crispatis pubescentia, ceterum parcissime puberula, costa supra subtusque prominula, nervis lateralibus 3–4-paribus supra subprominulis arcuato-ascendentibus, rete venularum obscuro; petiolus 5–10 mm. longus, supra anguste canaliculatus, canaliculi margine crispatis pubescente, apice glandulis paucis subulatis praeditus. *Inflorescentia* cymosa, flexuosa, saepius folia excedens, ad 4.5 cm. longa, pedunculis

ramulisque pubescentibus; bracteae subulatae, pubescentes, ad 1 mm. longae; pedicelli graciles, pubescentes, 5–9 mm. longi. *Calyx* alte 5-partitus, intus glandulis 5 minutis praeditus, lobis anguste triangularibus acutis extus leviter pubescentibus parceque ciliatis 1.5 mm. longis. *Corolla* viridula, glabra; lobi oblongo-ovati, obtusi, circiter 3 mm. longi, 1.5 mm. lati; tubus 1 mm. longus. *Coronae lobi* basi gynostegii affixi, leviter prominuli. *Gynostegium* circiter 1 mm. altum; antherarum appendices breves, caput stigmatis partim obtegentes; pollinia globosa; caput stigmatis pentagonale, apice leviter convexum. *Folliculi* ventricosi, apice acuminati, circiter 3 cm. longi.

Saraburi, Menam Sak, circiter 40 m., climbing on bushes at edge of river, *Kerr* 7025A (*type*); and climbing on *Homonoia riparia* at edge of river, *Kerr*, 7025; Nakawn Panom, Ban Han Pone, climber on roadside, flowers reddish, *Lakshnakara* 975.

Kerr 7025, from the same locality as the type, has, on the average, much larger leaves, reaching 8 cm. in length and 3.5 cm. in breadth. *Lakshnakara* 975 has leaves intermediate in size, but with pedicels and calyx glabrous.

Marsdenia (Eumarsdenia) calcicola *Kerr* [Asclepiadaceae–Marsdenieae]; *M. eriocauli* *Kerr* affinis, foliis ovatis, floribus minoribus inter alia differt.

Frutex volubilis, nisi corolla omnino dense crispatim pubescens, indumento cinereo vel brunneo-cinereo. *Folia* ovata, basi rotundata vel parum cordata, apice leviter acuminata, margine revoluta, ad 6.7 cm. longa, 3.5 cm. lata, chartacea, nervis lateralibus 5–6-paribus, cum costa supra inconspicuis subtus prominulis; petiolus 0.7–1.5 cm. longus. *Inflorescentia* axillaris, pedunculata, saepius subumbellata, rarius thyrsiformis, 1.5–2.6 cm. longa, pedunculo communi 0.6–1.2 cm. incluso; bracteae minutae; pedicelli circiter 2.5 mm. longi. *Calyx* alte 5-partitus, intus glandulifer; lobi late ovati vel suborbiculares, circiter 1.5 mm. longi, 1.25 mm. lati. *Corolla* suburceolata, in vivo alba, sicco nigrescens, extus glabra; tubus 2 mm. longus, intus fauce annulo piloso clausus, inferne pilis retrorsis in fasciculis 5 dispositis praeditus; lobi triangulares, subacuti, 1 mm. longi. *Coronae squamae* ligulatae, antheris breviores. *Gynostegium* circiter 2 mm. altum; stigmatis caput conicum, 5-lobatum, apice minute bifidum. *Folliculi* lanceolati, crispatim pubescentes, circiter 5.8 cm. longi.

Doi Chiengdao, circiter 2100 m., on limestone rocks, *Kerr* 6599.

In all the flowers examined the anthers appeared diseased, being thick and friable, the thickening often involving the whole of the membranous appendage. The pollinia could not be separated out from the cells.

Marsdenia (Eumarsdenia) eriocaulis *Kerr* [Asclepiadaceae–Marsdenieae]; *M. Balansae* Cost. affinis, foliis minoribus pro rata angustioribus distinguitur.

Frutex volubilis; ramuli teretes, graciles, pilis rufescentibus patentibus dense vestiti. *Folia* lanceolata, basi rotundata, apice longius acuminata, 5·8–9 cm. longa, 1·9–4 cm. lata, chartacea, supra pilis basi bulbosis praesertim ad costam nervosque cinereo-tomentosa, subtus similia sed praeterea secus costam nervosque pilis longis rufescentibus patentibus dense hirsuta, nervis lateralibus 5–6-paribus, subtus prominulis; petiolus 1·4–2·2 cm. longus, indumento ut caulibus instructus. *Inflorescentia* axillaris, thyrsoformis, pedunculata, omnino pilosa, 2–6 cm. longa, pedunculo communi 1·3–3·4 cm. incluso; bractae triangulares, circiter 0·5 mm. longae; pedicelli 2·5–3 mm. longi. *Calyx* alte 5-partitus, extus pilosus, intus glandulis minutis 5-paribus praeditus; lobi ovati, obtusi, circiter 1·75 mm. longi, 1 mm. lati. *Corolla* subcampanulata, breviter 5-lobata, in vivo alba (ex *Put*), sicco nigrescens; tubus subcylindricus, 3·25 mm. longus, extus glaber, intus fauce annulo piloso clausus, inferne pilis retrorsis in fasciculis 5 dispositis instructus; lobi subtriangulares, leviter inaequilaterales, subacuti, glabri, 1·25 mm. longi. *Coronae squamae* ligulae, dorso antherarum affixae et eis breviores. *Gynostegium* 1·7 mm. longum; antherarum appendices membranaceae, stigmatis caput obtegentes; pollinia oblonga, caudiculis parum longiora; stigmatis caput pentagonale, vertice apiculatum, minute bilobum. *Folliculi* ignoti. Chiengmai, Pang Tawn, *Put* 3872.

Stephanotis (Jasminanthes) pilosa Kerr [Asclepiadaceae–Marsdenieae]; ex affinitate *S. chinensis* Champ., a qua foliis majoribus, calycis lobis pro rata majoribus inter alia differt.

Frutex volubilis; rami robusti, siccitate fistulosi, longitudinaliter striati, pilis fulvis patentibus sat dense induti. *Folia* oblonga vel oblongo-obovata, basi cordata, apice subito breviterque acuminata, ad 19 cm. longa et 9·7 cm. lata, chartacea, siccitate supra cinereo-viridia, subnitida, sparse pilosa, subtus sat dense fulvo-pilosa praecipue ad costam nervosque, costa supra cum nervis lateralibus leviter impressa subtus prominente, nervis lateralibus utrinque 7–10 marginem versus arcuatis anastomosantibus, rete venularum subtus subconspicuo. *Inflorescentia* conferte cymosa, 2–6-flora, axillaris vel ramos contractos terminans, subsessilis vel pedunculata, foliis multo brevior; pedunculus robustus, striatus, dense pilosus, ad 25 mm. longus; bractae lineares, vel lineari-lanceolatae, pilosae, ad 16 mm. longae, 2 mm. latae; pedicelli 5–12 mm. longi, indumento pedunculi. *Calyx* ad basin 5-partitus, extus intusque pilosus, extus etiam minute verrucosus, intus ad basin glandulis minutis praeditus; lobi anguste oblanceolati, subacuti, 20–23 mm. longi, 4–8 mm. lati. *Corolla* alba, hypocrateromorpha; tubus cylindraceus, inferne sensim ampliatus, extus sulcatus et pilis brevibus patentibus indutus, intus superne sparse pilosus, basin versus pilis brunneis rigidis erectis in lineis bifariis 5 dispositis praeditus, 23–28 mm. longus; lobi falcato-oblongi, obtusi, extus pilosi, intus glabri, circiter 16 mm. longi,

10 mm. lati. *Coronae squamae* ut videtur nullae. *Gynostegium* circiter 7 mm. altum; stamina appendicibus oblongis submembranaceis stigmatis caput obtegentibus terminata; antherae pars inferior e lamina cartilaginea quadrangulati composita; pollinia obovoidea, circiter 1 mm. longa, corpusculo duplo longiora; stigmatis caput alte convexum. *Folliculi* desunt.

Loi, Dan Sai, Kao Keo Kang, circiter 1300 m., evergreen forest, *Kerr* 5769.

In the material of this collection all the flowers examined had been attacked by a grub, which paid its chief attention to the gynostegium, with the result that the structure was not easy to make out. As far as could be seen, however, there was no sign of a corona, or at least of any free portion of one.

LXI—BINGHAMIA, HAAGEOCEREUS AND PSEUDO-ESPOSTOA.—A. A. BULLOCK.

The desirability of full descriptions of new taxonomic groups, and of explicit designation of their types, is amply illustrated in the following discussion of the three generic names *Binghamia* Britt. et Rose, *Haageocereus* Backeb. and *Pseudoespostoa* Backeb.

Binghamia Britt. et Rose (Cactaceae, 2, 167: 1920) included two species, named *B. melanostele* and *B. acrantha*. The former species was ostensibly based on *Cephalocereus melanostele* Vaupel, but as shown below, this was due to a misidentification: the latter was based on *Cereus acranthus* Vaupel. Britton and Rose stated that the type species of *Binghamia* was *Cephalocereus melanostele* Vaupel, but there is no evidence that they ever saw Vaupel's plant, and their statement may be amended to "the type is the species which we have identified as *Cephalocereus melanostele* Vaupel," since this represents the actual facts.

Cephalocereus melanostele Vaupel, described very fully (in Engl. Bot. Jahrb. 50, Beibl. cxi. 12: 1913) from material collected by Weberbauer near Chosica, Peru, is characterized by bearing its flowers in lateral cephalia—"Cephalium laterale, crassissimum, lineari-oblongum, brunneum, aculeis egens, costas 8 obtegens." In Britton and Rose's key this plant runs down to *Espostoa* Britt. et Rose, and is excluded from *Binghamia*, which bears its flowers singly at unmodified areoles. The misidentification of *Cephalocereus melanostele* by Britton and Rose presumably arose from Rose having found what was actually a new species of similar habit at Chosica, Peru, the type-locality of *C. melanostele*. He found it also at Santa Clara, Peru, and Britton and Rose's description appears to have been drawn up from the Santa Clara material.

Werdermann and Backeberg (Neue Kakteen, 74-75, cum fig.: 1931) were the first to point out that Britton and Rose had wrongly identified *Cephalocereus melanostele* Vaupel. They described (*l.c.*) a new species, *Cereus* (Sect. *Binghamia*) *pseudomelanostele*, based on a plant collected by Backeberg near Cajamarquilla, Peru, and

went on to say that it was the same as the plant described by Britton and Rose as *Binghamia melanostele*, which the latter authors had later (Cactaceae, 4, 279 : 1923) considered to be conspecific with *Cereus multangularis* (Willd.) Haw.

Cereus pseudomelanostele was later (Backeb. et F. M. Knuth, Kaktus-ABC, 209 : 1935), transferred by Backeberg to *Haageocereus* Backeb., as *H. pseudomelanostele* (Werd. et Backeb.) Backeb., whilst *Cephalocereus melanostele* Vaupel was transferred by him (*op. cit.* 340) to a second new and monotypic genus *Pseudoespostoa* Backeb. The remaining element of *Binghamia* Britt. et Rose, *Cereus acranthus* Vaupel, was also transferred by him to *Haageocereus*. At the same time he transferred to *Binghamia* (*op. cit.* 195) two other species, referred to *Borziactus* Riccobono by Britton and Rose. Thus instead of retaining the name *Binghamia* for the two species actually described under it by Britton and Rose, or even for the ostensible generic type, *Cephalocereus melanostele*, Backeberg applied it to an entirely different genus, completely disregarding the type-method of nomenclature.

The publication of *Haageocereus* is somewhat involved. The first appearance of the name in print was, as far as has been ascertained, in Cact. and Succ. Journ. Amer. 3, 130 (1932), where, describing some of his discoveries in Peru, Backeberg says that he found :—" *Haageocereus rigidissimus* and *auricolor* gen. n. et sp. n." The only description is as follows :—" These are up to 1.20 metres (four feet) high, densely spiny, highly coloured cerei of exceptional beauty which have neither the hair of *Binghamia* nor the flower forms of *Borziactus*, and so form a separate sub-genus of *Cereus* (related to the old *Cereus multangularis* Haw. ??)." It is impossible to identify the genus from this information. For all practical purposes the generic name is a *nomen nudum*, and since there is no description whatever of the two species mentioned, their names also are *nomina nuda*.

The second appearance of the name *Haageocereus* is in Cact. Journ. 1, 52 (1933), where Backeberg makes the amazing statement: "... the Binghamias described by Dr. Rose are nothing of the kind, but have spread from Ecuador to Central Peru ; (on account of their rotate flowers which do not arise from areoles furnished with a true cephalium, I have designated them *Haageocereus* g.n. or subg. n.)." Apart from other considerations the meaning of the term 'rotate' in this context is obscure, since all the plants concerned have comparatively long funnel-form flowers. Whether the vague and misleading diagnostic characters can be accepted as validating publication of the name or not is immaterial, since it is clearly a superfluous name for *Binghamia* Britt. et Rose, and must on that account be rejected.

The third appearance of the name *Haageocereus* is in Backeberg's Blätter Kakteenforsch. 1934, pt. 3 [p. 4], where it appears in the author's systematic list of genera as follows :—

"[Genus] 52. *Haageocereus* Bckb. (C. *pseudomelanostele* W. & B.)." It can only be assumed that in this case *Haageocereus* Backeb. is intended to be typified by *Cereus pseudomelanostele* Werderm. et Backeb. (in Backeb. *Neue Kakteen*, 74 : 1931 ; Werderm. in Fedde, *Repert.* 30, 61 : 1932). Werdermann had made a curious orthographic error under his citation of *Cereus pseudomelanostele* in Fedde, *Repert.* 30, 61 (1932). He cited as a synonym *Binghamia acrantha*, giving the reference to Britton and Rose as "S. 167," whereas that name actually occurs (apart from the key to species) only on page 168. It seems clear that Werdermann intended to cite *Binghamia melanostele* Britt. et Rose (excl. syn.), since otherwise he would have used the earlier epithet *acranthus* (Vaupel, 1913) in place of *pseudomelanostele*. The locality, Chosica, which he cites for *Cereus pseudomelanostele* indicates that he included under it the type-element of the generic name *Binghamia*, since the type-locality of *C. pseudomelanostele* was Cajamarquilla.

The fourth appearance of the name *Haageocereus* was again in Backeberg's *Blätter Kakteenforsch.* 1934, pt. 6 [p. 1], where a meagre description was given which may be accepted as validating publication of the name. Backeberg went on to say, "When drawing up the description of *Binghamia* Rose proposed [*sic*] *Cereus aurivillus*, for he did not find it in Peru and possibly thought it identical with *Haageoc. pseudomelanostele*." The French version is a little more explicit, "hors de la rédaction de la description générique pour *Binghamia* le Dr. Rose aura certainement eu devant lui un *Cereus aurivillus* qu'il n'a pas trouvé au Pérou et qu'il a probablement tenu pour identique à *Haageocereus pseudomelanostele*." Since Britton and Rose explicitly state that the plant which they described as *Binghamia melanostele* was collected and photographed respectively by Rose at Chosica and Santa Clara, Peru, Backeberg's statement and assumption cannot be accepted. Incidentally, Britton and Rose placed *Cereus aurivillus* K. Schum. in the genus *Borziactus* Riccobono. *Haageocereus pseudomelanostele* (Werd. et Backeb.) Backeb. is the only species of *Haageocereus* mentioned here by Backeberg.

The fifth and, as far as has been found, last appearance of the name *Haageocereus* is in Backeb. et F. M. Knuth, *Kaktus-ABC*, 207 (1935), where nine species are listed in alphabetical order. The type-element of *Binghamia*, together with *Binghamia acrantha* (Vaupel) Britt. et Rose, is again included, and this gives final proof that *Haageocereus* is a superfluous name for *Binghamia*.

Backeberg (*Blätter Kakteenforsch.* 1934, pt. 10 [p. 7], et in Backeb. et F. M. Knuth, *Kaktus-ABC*, 195 : 1935) misapplied the name *Binghamia* to a genus including two species, *Cactus Humboldtii* H.B.K. and *Cactus icosagona* H.B.K. (the latter including *Cereus aurivillus* K. Schum.), which were placed under *Borziactus* Riccobono by Britton and Rose. In 1934 he stated, "... Dr. Rose has constituted a special genus for South American Cerei which 'develop

on the side of the head capable of bearing flowers, a cephalium-like tuft'." The source of Backeberg's quotation has not been found. What Britton and Rose stated was: "The top of the flowering plant is made up of a compact mass of long white or yellowish bristle-like spines from one side of which the flowers appear, and this F. Vaupel has termed a lateral cephalium."

The present writer is not prepared to say whether the two species placed under *Binghamia* by Backeberg really constitute a genus distinct from *Borzicactus* Riccobono, but if they do, the genus concerned requires a new name and a diagnosis. A new name, *Seticereus*, has been provided for this genus by Backeberg (in Jahrb. Deutsch. Kakteenges.: 1937, et Blätter Kakteenforsch. 1937, pt. 11 [p. 5]) on the ground that *Binghamia* was a *nomen confusum*. On the whole it seems preferable to retain the two species concerned under *Borzicactus*, in which case the name *Seticereus* Backeb. becomes a taxonomic synonym of *Borzicactus* Riccobono. In any case it is not synonymous with *Binghamia* Britt. et Rose. In this connexion, it may be added that the writer sees no reason for separating *Loxanthocereus* Backeb. (in Jahrb. Deutsch. Kakteenges.: 1937, et Blätter Kakteenforsch. 1937, pt. 11 [p. 3]) from *Borzicactus*. The distinctions given appear to be of a purely specific nature.

The genus *Pseudoespostoa* Backeb. is in the writer's opinion not sufficiently distinct from *Espostoa* Britt. et Rose to warrant generic segregation, and the reduction and new combination necessitated by this view are made below.

Following the classification outlined above, the correct names and synonymy of the genera and species directly involved in the above discussion are as follows:—

1. ***Binghamia*** Britt. et Rose, Cactaceae **2**, 167 (1920); non Backeb. Blätter Kakteenforsch. 1934, pt. 10 [p. 7], et in Backeb. et F. M. Knuth, Kaktus-ABC, 195 (1935).—*Haageocereus* Backeb. in Cact. et Succ. Journ. Amer. **3**, 130 (1932), nomen in obs., et in Cact. Journ. **1**, 52 (1933), in obs., et Blätter Kakteenforsch. 1934, pt. 3 [p. 4], in sched., et *op. cit.* pt. 6 [p. 1], cum descr., et in Backeb. et F. M. Knuth, Kaktus-ABC, 207 (1935).

B. pseudomelanostele (Werderm. et Backeb.) Bullock, comb. nov.—*B. melanostele* Britt. et Rose, Cactaceae, **2**, 167 (1920), excl. syn. [i.e. non *Cephalocereus melanostele* Vaupel (1913)].—*Cereus pseudomelanostele* Werderm. et Backeb. in Backeb. Neue Kakteen. **74** (1931); Werderm. in Fedde, Repert. **30**, 61 (1932), excl. syn.—*Haageocereus pseudomelanostele* (Werderm. et Backeb.) Backeb. Blätter Kakteenforsch. 1934, pt. 6 [p. 1], et in Backeb. et F. M. Knuth, Kaktus-ABC, 209 (1935).

Eight other species, including *Binghamia acrantha* (Vaupel) Britt. et Rose, are listed by Backeberg under *Haageocereus*. If all these prove to be distinct, they must be transferred to *Binghamia*.

2. *Espostoa* Britt. et Rose, Cactaceae, **2**, 60 (1920); Backeb. in Backeb. et F. M. Knuth, Kaktus-ABC, 340 (1935).—*Pseudoespostoa* Backeb. Blätter Kakteenforsch. 1934, pt. 10 [p. 1], et in Backeb. F. M. Knuth, Kaktus-ABC, 340 (1935).

E. *melanostele* (Vaupel) Bullock, comb. nov.—*Cephalocereus melanostele* Vaupel in Engl. Bot. Jahrb. **50**, Beibl. cxi 12 (1913).—*Binghamia melanostele* (Vaupel) Britt. et Rose, Cactaceae, **2**, 167 (1920), quoad syn. tantum.—*Pseudoespostoa melanostele* (Vaupel) Backeb. Blätter Kakteenforsch. 1934, pt. 10 [p. 1], et in Backeb. et F. M. Knuth, Kaktus-ABC, 340 (1935).

LXII—THE TAXONOMIC POSITION OF TETRATHALAMUS. B. L. BURTT.

In 1905 Lauterbach (1) described a new genus and species from New Guinea under the name *Tetrathalamus montanus* and placed it in the family *Guttiferae*, next to *Garcinia*. Here, and again in his later treatment of the genus (2), Lauterbach apparently had no doubts about referring *Tetrathalamus* to *Guttiferae*, and even Engler (3) places it between *Garcinia* and *Tripetalum* without comment.

To neither of these genera does it show any real resemblance, but when, quite by chance, it was examined shortly after working on the *Winteraceae* a possible affinity became evident, for it closely resembles certain New Guinea species of *Bubbia*.

It is necessarily a difficult matter to contrast a single species with a large and variable family like *Guttiferae*, but we can tabulate the following morphological characters, which, taken together, certainly justify the exclusion of *Tetrathalamus* from *Guttiferae*.

Tetrathalamus has:—

- (1) Branchlets terete—not angled as is frequent in *Guttiferae*.
- (2) Leaves alternate [as far as can be seen from the specimen at Kew and Lauterbach's figure (2)]—this is a very rare condition in the true *Guttiferae*.
- (3) Leaves pellucid-punctate—not showing resinous streaks as is usual in *Guttiferae*.
- (4) Leaves with a waxy deposit on the lower epidermis.
- (5) Carpels not united to the apex.
- (6) Carpels with 3 ovules—there is only 1 ovule in each cell in the subtribe *Garcinieae*.

On the other hand, if we compare *Tetrathalamus* with members of the *Winteraceae* we find a striking agreement on many points. The presence of oil-containing cells both in the cortex of the branchlets and in the leaf, giving the latter its characteristic pellucid-punctate appearance, is constant throughout the *Winteraceae*. The waxy deposit on the lower epidermis is also found in many species in that family. With regard to the carpels, the genera of *Winteraceae* show a transition from numerous free carpels to few

united carpels and in this character *Tetralthalamus* may be placed between *Bubbia* (which has free carpels) and *Zygogynum* and *Exospermum* in which they are united or at least coherent. The ovules are borne on the inner upper angle of the carpel as in other *Winteraceae*.

The perianth of *Tetralthalamus* is described as consisting of 4 sepals and 4 petals and there are three small bracteoles just below the calyx. A whorl of three bracteoles in such a position would be unusual and it seems better to follow the current interpretation of the flower of such genera as *Bubbia* and *Zygogynum* and to regard these three small structures as sepals and the corolla as consisting of two whorls of four members each.

The androecium of *Tetralthalamus* is also very like that of *Winteraceae* and consists of about 12 stamens with rather thick filaments and the anther cells placed transversely at the top. This seems to be unlike any of the varied forms of stamen found in *Guttiferae*, but closely resembles a species like *Bubbia Howeana*.

A morphological examination of *Tetralthalamus* suggests, therefore, that the real affinity of the genus is to be found in the *Winteraceae* and not in the *Guttiferae*, where it has hitherto been placed.

This conclusion is given final confirmation by an anatomical characteristic, the possession of entirely tracheidal xylem, which is diagnostic of the *Winteraceae* and is also possessed by *Tetralthalamus*.

As to the position of the genus within the family, Hutchinson (4) has given a key to the genera in which the question of the union of the carpels is considered of primary importance and two tribes *Drimydeae*—"carpels free, especially in fruit"—and *Exospermeae*—"carpels more or less united, especially in fruit"—are recognized, in addition to *Illiceae* which is distinguished by its imbricate sepals. Unfortunately fruits of *Tetralthalamus* are as yet unknown but the carpels are certainly united for three-quarters of their length in the flowering stage. The tribe *Exospermeae* contains only two genera, both endemic to New Caledonia: *Exospermum* differs from *Tetralthalamus* in having 7-8 carpels and linear stigmata, as well as in its solitary flowers: *Zygogynum*, the other genus of this tribe, has the carpels more closely united than in *Tetralthalamus*, for they are separated from one another only by a thin wall; this genus, too, has large solitary flowers.

Superficially, as well as phytogeographically, *Tetralthalamus* is more closely allied to *Bubbia*, one of the *Drimydeae*, than to either of the *Exospermeae*. In *Bubbia* some species are found with small flowers and much branched inflorescences, but the carpels are always free to the base and the stigmata are of the linear type. Nevertheless the real affinity of *Tetralthalamus* seems to be with some of these small-flowered, New Guinea species and for the present it may be regarded as a distinct genus closely allied to *Bubbia*.

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LXIII—ON THE FLORA OF THE NEARER EAST: XIX.* ADDITIONS, ETC., TO THE FLORA OF CYPRUS. A. K. JACKSON and W. B. TURRILL.

The material at Kew from the island of Cyprus has been much increased during the past few years by numerous collections made by residents or visitors. Several of these collections are of considerable size and have added greatly to our knowledge of the flora. Not only have numerous gaps in the Herbarium been filled in, but the known distribution of many species has been extended, and species hitherto unrecorded for the flora of Cyprus, including several new to science, have been discovered. It is particularly gratifying that most of the collectors have provided abundant and beautifully dried material of the plants collected, frequently at different stages of their life-history. Some of the new records have already been published (*K.B.* 1933, 407; 1934, 271; 1936, 16; 1937, 341). New and extended collections are, however, still being received and it is evident from these that much detailed work remains to be done before sufficient precisely determined material is available for the preparation of an adequate Flora of the island.

Special reference should be made to the magnificent collection of Mrs. E. W. Kennedy, mainly from the mountainous areas of the centre and north of Cyprus. Specimens collected under more than 1200 numbers have now been received from her. Most of these numbers are represented by at least several sheets, which between them often illustrate various stages in the life-history, habitat modifications, and general range of variation. Valuable field notes accompany the specimens.

From Lady Loch we have received interesting collections made in different parts of Cyprus and including a number of new records.

Mr. A. Syngrossides, of the Department of Agriculture, continues to send material which not only enriches the Kew collections but is making it possible to build up a local herbarium at Nicosia. His collection, as received at Kew, now exceeds 1900 numbers.

The present paper contains records of species whose occurrence in Cyprus was unknown, unpublished, or in some respect uncertain or incompletely known. These records are arranged systematically

* Continued from *K.B.* 1937, 86.

according to the Bentham and Hooker classification. It is hoped that their publication will encourage collectors to continue their researches and, perhaps, entice other residents and visitors to help in making it possible to prepare a Flora of the island.

Ranunculus bullatus L. Sp. Pl. 550 (1753).

Kyrenia, coast, in pockets of soil on dry rocks at sea-level, 31.10.37, *Lady Loch* 7.

This species was recorded from several localities by Kotschy, Cypern 315 (1865) but was not seen by Holmboe. Kotschy records it from "bei Papho an den Felsen von Ktima blühend im November 1840. In der Gegend von Kalochorko unweit Larnaca 1862. Bei Ormidia unweit Famagosta in der Tracheotis häufig."

The occurrence of this species in Cyprus, substantiated by Lady Loch's specimen, is of considerable interest. Its distribution is mainly western in the Mediterranean Basin: Portugal, Spain, Corsica, Sardinia, Italy, Sicily, Malta, Crete, Cephalonia, Morocco, and Algeria.

Ranunculus Ficaria L. Sp. Pl. 550 (1753).

In Cyprus, *R. Ficaria grandiflora* Schultz (see Bot. Mag. t. 9199: 1927) appears to be widely distributed, especially in the lower regions. Specimens from Platres, 1400 m., 20.3.37, wet flat ground by a winter-time rivulet, *E. W. Kennedy* 425, show leaf-blades of an unusual shape. They are broadly elliptic or elliptic-ovate, rounded at the apex, and more or less truncate at the base, up to 5.8 cm. long and 4.3 cm. broad. One specimen under this number has normally shaped leaf-blades with more or less cordate bases. The truncate leaf-bases of the other specimens are usually very striking, but occasionally they are very slightly cuneate. There is no trace of divergent or over-lapping lobes. The peculiar blade shape appears also in leaves from tuber plantlets. The flowers measure up to 4 cm. in diameter.

Viola Kitaibeliana R. et S. Syst. 5, 383 (1819).

Holmboe (Stud. Veg. Cyp. 132: 1914) records *V. occulta* Lehm., as collected in Cyprus by Unger and Kotschy, on the authority of Boissier, Flor. Or. 1, 467 (1867). The specimen at Kew of Kotschy 710, "In hortis ad Prodomo et in faucibus umbrosis pagi Fini Majo," is *V. Kitaibeliana* R. et S. The same species has also been collected by Mrs. Kennedy.

Kryos Potamos, 16.3.38, 890 m., flat grassy slope at the river's edge, petals white, lower one yellow, deeper shade at base, with purple lines, *E. W. Kennedy* 636; Platres, 22.3.38, 920 m., bank between a stream and a vineyard, *E. W. Kennedy* 637; Platres, 28.3.38, 1100 m., on a bank above a terrace of cultivated land on the dry mountain-side, the bed of a gully, *E. W. Kennedy* 637A.

Lobularia maritima (L.) Desv. Journ. Bot. 3, 162 (1814).

Platres, 11.6.37, 1153 m., dry mountain-side, among garigue bushes, *E. W. Kennedy* 486.

This is new to Cyprus. The species is widely spread in the Mediterranean Basin and the Canary Islands.

Dianthus cyprius *A. K. Jackson et Turrill*, a *D. pendulo* Boiss. et Bl. planta in parte inferiore valde fruticosa, foliis latoribus, floribus subcorymboso-aggregatis, et squamis calycinis latoribus differt.

Suffrutex, caulibus saepe pendulis in parte inferiore lignosis usque ad 5 mm. diametro. *Caules* usque ad 3.7 dm. alti, glabri, inferne plerumque ramosi. *Folia* caulina, linearia vel angustissime lanceolato-linearia, apice acuta, vel subacuminata, basi leviter latoria, sessilia, in vaginam 0.5–3.5 mm. longam connata, inferiora 5–9 cm. longa et 2.5–3 mm. lata, superiora gradatim breviora sed vix angustiora, margine inferne minute hispidula superne fere glabra, nervis in pagina superiore inconspicuis, infra subprominentibus. *Inflorescentia* subcorymboso-aggregata, 3–8-flora, floribus fere sessilibus; squamae calycinae 10–16, adpresse imbricatae, ovato-oblongae, acutae vel subacutae, superiores 1.2 cm. longae et 3 mm. latae, margine saepe minutissime ciliatae, inferiores multo minores. *Calyx* cylindricus, 2.5 cm. longus, 4–5 mm. diametro, glaber, dentibus lanceolatis acutis 5–6 mm. longis 1.5 mm. latis margine anguste membranaceis subciliatis. *Petala* rosea, saepe purpureo-maculata, 3.5 cm. longa, lamina obovata 1–1.4 cm. longa breviter digitato-incisa basi barbulata. *Stamina* leviter exserta, filamentis 2.4 cm. longis, antheris 2.5 mm. longis. *Ovarium* ovato-cylindricum, 4.5 mm. altum, 1.5 mm. diametro; styli 0.7–1.1 mm. longi; gynophorium 2.5 mm. longum. *Capsula* cylindrica vel anguste ellipsoideo-cylindrica, 2.3 cm. longa, 5 mm. diametro, dentibus anguste triangularibus 4.5 mm. longis obtusis; carpophorium 4 mm. longum. *Semina* oblongo-elliptica, 1.5 mm. longa (margine membranacea inclusa), laevia.

St. Hilarion castle, 20.10.29, *C. B. Ussher* 68; Kyrenia, 14.11.36, 338 m., limestone. In cracks of precipitous rock, facing north. Often big bushes, hanging down, branches 3 feet long, *E. W. Kennedy* 408 (type).

Dianthus cyprius is to be placed in the section *Dentati* Boiss. (Flor. Or. 1, 480, 498: 1867). Within this section it is most clearly related in morphological structure to *D. pendulus* Boiss. et Bl. and *D. actinopetalus* Fenzl. The former is a Syrian species and the characters distinguishing it from *D. cyprius* are given in the differential diagnosis. *D. actinopetalus* is a native of western and southern Asia Minor and, according to Boissier, N. Syria. It has fewer (4–8) calyx scales than either *D. cyprius* or *D. pendulus*. This occurrence of a number of morphologically closely related species in the Nearer East geographically more or less vicarious one with another suggests the break-up of a common ancestral species.

Tunica Kennedyae *A. K. Jackson et Turrill*, a *T. pachygonia* Fisch. et Mey. inflorescentia valde glandulosa, foliis caulinis erectis, floribus seminisque minoribus, calycis costis uninerviis, petalis

bifidis facile distinguitur ; a *T. illyrica* (L.) Fisch. et Mey. radice annua et petalis minoribus differt.

Herba annua, 0.6–2.8 dm. alta. *Caulis* erectus, subrigidus, saepe basi plus minusve ramosus, superne (inflorescentiae ramis praecipue) glanduloso-viscidus, inferne breviter glanduloso-hispidus, in parte media glaber vel glabrescens. *Folia* basalia oblongo-elliptica, apice rotundata vel obtusa, usque ad 1.2 cm. longa et 4 mm. lata, glabra vel sparse hispidula, basi leviter ciliolata, caulina anguste linearia, subacuta 0.5–1.5 cm. longa et 0.5–2 mm. lata, trinervia, ad caulem plus minusve adpressa, glabra. *Inflorescentia* laxa, floribus solitariis ebracteolatis, pedicellis usque ad 2.5 cm. longis saepe dense glanduloso-viscidis. *Calyx* turbinatus, subpentagonus, 5–6 mm. longus, 1.5 mm. diametro, plerumque glanduloso-viscidus, perraro fere glaber, costis uninerviis saepissime rubris vel purpureis, inter angulos membranaceo-albidus, dentibus triangularibus acutis circiter 0.5 mm. longis. *Petala* in pagina superiore alba, inferiore rubra, lineari-spathulata, 7–8 mm. longa, lamina circiter 1 mm. lata bifida, 1–2 mm. exserta. *Stamina* inclusa, 2–4 mm. longa, glabra. *Ovarium* oblongo-ellipsoideum, 1.5 mm. longum et circiter 1 mm. diametro, glabrum ; styli 0.5 mm. longi. *Capsula* anguste ellipsoidea, 7–8 mm. longa, apice 1–2 mm. exserta, dentibus ovato-oblongis 2 mm. longis obtusis vel subacutis recurvis. *Semina* oblonga, irregulariter compresso-concava, basi abrupte angustata, 1.5 mm. longa, 0.75 mm. lata (ala inclusa), laevia, minutissime punctata, nigra.

Prope Prodromo in monte Troodos, 17.6.1880, *Sintenis et Rigo* 764 ; Platres, 6.5.37, among garigue, dry mountainside, 1050 m., *E. W. Kennedy* 360 ; Platres, 19.6.37, garigue on dry mountainside, 800 m., *E. W. Kennedy* 361 ; Platres, 21.7.37, steep mountainside among *Quercus alnifolia* and Pine trees, 1350 m., *E. W. Kennedy* 362 ; Platres, 19.5.38, dry mountainside where rain has run. In the open sun in bare patches among the garigue, below a bush or a rock that held the rain, 990 m. Petals red outside, pale inside, notched, *E. W. Kennedy* 1036 ; Platres, 18.6.38, 900–1000 m., plentiful, *E. W. Kennedy* 1037 (type) ; Kryos Potamos, 20.6.38, 890–1550 m., *E. W. Kennedy* 1038.

This species seems to be very different in a number of obvious and important characters from *T. pachygona*, which is the only other species of *Tunica* (excluding *Kohlrauschia*) recorded from Cyprus. So far as one can judge from the abundant dried material it is an "annual," but may be an overwintering annual with autumn germination of the seeds. It certainly appears to be monocarpic.

No material has been seen of *T. Davaeana* Coss. in Bull. Soc. Bot. Fr. 36, 103 (1889). This was described from material collected in Cyrenaica and the somewhat incomplete description suggests an affinity with *T. pachygona* and *T. Kennedyae*. It is, however, said to have a rather thick fusiform root, leaves subulate at the apex, green calyx nerves, narrowly oblong petals with the claw passing

gradually into a dilated limb, and seeds broadly winged with a retuse base.

***Allyssum fulvescens* S. et S. Prodr. Fl. Graec, 2, 13 (1813).**

This species was originally described, without an exact locality being given, from Cyprus. It has now been received from Platres, 960 m., 27.2.37, dry mountainside, in the shade of *Cistus*, *E. W. Kennedy* 512.

***Silene Behen* L. Sp. Pl. 418 (1753).**

This species is recorded by Boissier (Flor. Or. 1, 584 : 1867) from Cyprus, as collected by Kotschy, but no more precise locality is given. We now have in the Herbarium at Kew the following specimens from Cyprus: in campis prope Kythraea, 11.4.1880, *Sintenis et Rigo* 249; in agris pr. Hagios Andronicus, 22.4.1880, *Sintenis et Rigo* 249; in agris pr. Yalussa, 22.4.1880, *Sintenis et Rigo* 249; Houstons, Kyrenia, 3.1902, *A. G. and M. E. Lascelles*; Government House, Nicosia, 200 m., 23.3.1927, *A. Huddle* 21; Kormathitis, 60 m., on field terraces, 31.3.1936, *A. Syngrassides* 1221; near Phassouri (Limassol), 45 m., on red soil, in broad bean cultivation, 12.4.1938, *A. Syngrassides* 1802.

***Portulaca oleracea* L. Sp. Pl. 445 (1753).**

Platres, 1200 m., 28.6.37, in fallow land terraced on the side of a gully, *E. W. Kennedy* 1034. Flowers yellow, fruit purple.

This species, now known from nearly all the warmer parts of the world, has, apparently, been recorded previously from Cyprus only by Kotschy.

***Geranium columbinum* L. Sp. Pl. 682.**

Cape Andreas, on red rocky soil, 100 m., 29.3.1938, *A. Syngrassides* 1767. Petals violet-rose.

This species, widely spread in Europe, the Nearer East, and Central Asia, has, apparently, not been previously recorded from Cyprus.

***Ornithopus compressus* L. Sp. Pl. 744 (1753).**

Kryos Valley, Platres, 900 m., 24.3.37, *E. W. Kennedy* 571A; Platres, 1100 m., 28.3.38, *E. W. Kennedy* 571B.

This species, widely spread in the Mediterranean Region, has apparently not previously been found in Cyprus.

***Trifolium pratense* L. Sp. Pl. 768 (1753).**

Kryos Potamos, 1700 m., 20.6.37, edge of stream, at the foot of a wet, very shady, high bank on the steep mountainside, *E. W. Kennedy* 558.

This species, widely spread in Europe, the Orient, and N. Asia, has not apparently hitherto been recorded from Cyprus.

***Trifolium subterraneum* L. Sp. Pl. 767 (1753).**

Kryos Potamos, 1000 m., 24.3.37, under *Cistus* on dry mountainside above the stream, *E. W. Kennedy* 564.

A new record for Cyprus. The species is widely spread throughout the Mediterranean Region and western Europe.

***Vicia lathyroides* L. Sp. Pl. 736 (1753).**

Platres, 1000 m., 20.3.37, under *Cistus* on dry mountainside above a winter-time rivulet, flowers blue, *E. W. Kennedy* 585; Platres, 22.3.38, 1030 m., on a bank under a hedge by a path through vineyards on a gentle slope of the mountain, *E. W. Kennedy* 586; Kryos Potamos, 24.3.37, 900 m., under *Cistus* on the dry mountainside above the stream, flowers blue, *E. W. Kennedy* 587.

This species, widely spread in Central Europe and the Mediterranean Basin, was recorded from Cyprus by Sibthorp et Smith (*Prodr.* 2, 71: 1813) but without exact locality. The record in the *Prodromus* says "In Cypri arvis; etiam in agro Cariensi, et Eliensi," and adds "*Flores in exemplaribus Sibthorpianis albid, vexillo striato.*"

***Geum heterocarpum* Boiss. Voy. Bot. Espagne, 201. t. 63 (1839).**

Chionistra, 2000 m., 13.7.37, under a Juniper tree, on the steep rocky northern slope, growing thickly together, *E. W. Kennedy* 595; also 16.6.38, *E. W. Kennedy* 1044; also 23.6.38, *E. W. Kennedy* 1045; also 6.7.38, *E. W. Kennedy* 1046.

This species is widely spread in the mountain altitudinal zones in the Mediterranean Region. It appears to be frequently associated with junipers.

? ***Siler cordifolium* Boiss. in Flor. Or. Suppl. 263 (1888).**

Aphamis, 30.7.37, limestone mountain, 1150 m., some among garigue and others in a vineyard with *Sideritis* and *Stachys*, *E. W. Kennedy* 674; Aphamis, 21.8.37, 10.9.37, 2.10.37, limestone mountain, 1000 m., on limestone and on an outcrop of igneous rock. Among garigue of *Genista fasselata* (*sphacelata*) and in vineyards. Flower-stalk has a bitter smell. Mericarps purple with white wings. More numerous than at 1150 m., *E. W. Kennedy* 675; Platres, 29.9.37, igneous rock, 1600 m., few plants on a shady slope towards a rain gully under pine trees and among bracken, *E. W. Kennedy* 676.

As pointed out by Holmboe (*Stud. Veg. Cyp.* 141: 1914) the position of this plant is uncertain as ripe fruits have not been described. Ripe or nearly ripe fruits are included in Mrs. Kennedy's collection. These show that the species is not to be included in the genus *Siler* as usually understood. The fruit structure is very close to that of certain species of *Ferula* (in the sense of Bentham and Hooker), and ? *S. cordifolium* may eventually have to be removed either to *Ferula* or made the type of a new genus.

***Lactuca triquetra* (Labill.) Boiss. Flor. Or. 3, 819 (1875).**

Above Yerasa from Agros to Limassol, 480 m., 8.10.37, on chalky cliffs, forming a large group of perennial rootstocks, many growing together; flowers violet bluish, *A. Syngressides* 1698.

The species has hitherto been recorded from Syria only, so far as is known.

Pyrethrum Balsamita (L.) var. **tanacetoides** Boiss. Flor. Or. 3, 346 (1875).

Kryos Potamos, 1700 m., 7.9.37, on a wet slope in the shade of pine trees near the stream, *E. W. Kennedy* 945.

Troodos, Government Cottage, 1500 m., cultivated, 6.10.37, *A. Syngrassides* 1685.

The species is Oriental, ranging from E. Asia Minor to Persia.

Ipomoea stolonifera (Cyr.) J. F. Gmel. Syst. 345 (1791). *Convolvulus stoloniferus* Cyr. Pl. rar. Neap. fasc. 1, t. 5 (1788). *Ipomoea littoralis* (L.) Boiss. Fl. Or. 4, 112 (1879).

Famagusta, sand by sea-shore, 9.11.1937, *Lady Loch* 12. Creeping with long branches; flowers greeny white; leaves varying in shape.

This is a species not previously recorded from Cyprus. The nomenclature presents some difficulty and we have adopted the name *I. stolonifera* since it seems the least ambiguous of those so far proposed and is founded on a good description and figure. The distribution of the species is interesting. It occurs on coastal sands in Italy, Palestine, Syria, Egypt, Morocco, and the Azores. In Eastern Tropical and Subtropical America (from Florida to Brazil), again near the shore, there occur plants which have, under one or another synonym, been considered to be the same species as *I. stolonifera*. Some of the specimens thus identified appear to us to be specifically distinct, but material from Florida is probably best regarded as conspecific.

Sideritis perfoliata L. Sp. Pl. 575 (1753).

Aphamis, limestone mountain rising south of Chionistra, 1200 m., 4.7.37, among garigue, with *Silene*, etc., *E. W. Kennedy* 794, the root smells of poppies and the leaves of lemon-scented verbenas; the flowers are cream-coloured; Aphamis, district of Limassol, on limestone mountainside, facing north, in garigue, 1200 m., 6.8.38, *E. W. Kennedy* 1076, corolla palest yellow inside and out.

The distribution of *S. perfoliata* is uncertain. The group to which it belongs requires revision. We are, for example, unable to separate *S. glandulifera* Post from *S. perfoliata* as this latter is usually accepted. Post's description does not agree in important particulars with authenticated material in the Herbarium at Kew. *S. perfoliata* has probably a wide distribution in Asia Minor, Syria, and Palestine.

Euphorbia aleppica L. Sp. Pl. 458 (1753).

Kyrenia, 30.10.36, 62 m., on limestone, among garigue between cultivated land and a gully, on the slope between the precipice and the sea, *E. W. Kennedy* 612.

New to the flora of Cyprus. The species is widely spread from southern Italy, the southern and western Balkan Peninsula, east to Asia Minor, Palestine, Syria, and Iraq.

Euphorbia Apios L. Sp. Pl. 457 (1753).

Kyrenia, 29.10.36, on limestone near the edge of the sea on flat rocky ground, *E. W. Kennedy* 610 ; Xerovounos (Pyrgos), 19.10.37, 310 m., on dry mountains and hills, *A. Syngrassides* 1721. Root-stock tuberous, leaves with shaggy hairs, fruit trilobed, with red spots.

This appears to be a new record for the island. The species is widely spread in the hill and montane zones in Greece, Macedonia, Thrace, S. Bulgaria, Asia Minor, and Syria. It is also recorded from southern Italy.

Euphorbia biglandulosa Desf. in Ann. Mus. Par. 12, 114 (1808).

This species was recorded from Cyprus in *K.B.* 1934, 273. The following additional specimens have now to be included: Troodos, June 1880, *Sintenis et Rigo*, 695 ; Cyprus, April 1901, *Lascelles* ; Troodos, July 1914, *Feilden* 4 ; Troodos, July 1929, *Ussher* 70 ; Kryos Potamos, 1200 m., 18.2.37, in rock hanging over the bank of the river, *E. W. Kennedy* 604 ; Platres, in rock among garigue on the mountainside, sloping down to a wintertime rivulet, branches spreading down the rock, 21.2.37, 990 m., *E. W. Kennedy* 605 ; Kryos Potamos, 25.2.37, 920 m., in rock on flat ground at the edge of the stream, the branches falling and spreading on the ground, none upright, *E. W. Kennedy* 606 ; Kryos Potamos, 10.3.37, 890 m., in rock near the stream, a flat damp shady place, *E. W. Kennedy* 607 ; Kryos Potamos, 28.4.37, 1300 m., in rock in the bed of the shrunken river, *E. W. Kennedy* 608 ; Kryos Potamos, 17.5.37, 1170 m., hanging down on rock high above the stream, *E. W. Kennedy* 609 ; Troodos mnts., on rocky land near the road, 1700 m., July 1937, *Wyatt* 22.

This species is closely related to *E. Myrsinites* L., which is recorded by Holmboe from localities in the Troodos range, but no authentic specimens of the latter species from Cyprus have been seen.

Fritillaria acmopetala Boiss, Diagn. Ser. 1, 7, 104 (1846) ; Stapf in Bot. Mag. t. 9148 (1928).

Karmi, 270 m., fields, 29.3.37, *Lady Loch* 17 ; Templos, 100 m., cultivated fields under olives, 30.3.38, *Lady Loch* 55 ; Karmi and Trimithi (Kyrenia district), 60-250 m., in cereal crops, 4.4.38, *A. Syngrassides* 1784.

This is a new record for Cyprus. Hitherto *F. acmopetala* has been known from Syria (Amanus and Lebanon), and southern Asia Minor (from Cilicia to Lycia).

Colchicum Steveni Kunth Enum. Pl. 4, 144 (1843) ; Stefanoff Monogr. Colch. 57 (1926).

Below Vasilia, 17 m., 31.10.37, dry banks of soil between cultivation, *Lady Loch* 9. Growing in clumps with six leaves fully developed ; perianth segments 8-10-nerved.

This is a new record for Cyprus. The species is known from Syria, Palestine, and Cilicia.

C. hiemale Freyn in Bull. Herb. Boiss. 5, 802 (1897); Stefanoff Monogr. Colch. 56 (1926).

The following specimens from localities additional to those quoted by Stefanoff have recently been received: Ag. Parasthenis, Government House, Nicosia, 175 m., 13.11.35, on rocky fields, *A. Syngrossides* 858; Ag. Chrysostomos, 330 m., 25.11.36, stony soil among olives, *Lady Loch* 14; Haleysa, 660 m., 24.11.36, stony maquis below rocky cliffs—thinly distributed in only one patch, *Lady Loch* 8; Athalassa, 175 m., 3.12.36, stony arid soil, on hillocks above Messaria plain—growing in profusion, *Lady Loch* 15; three miles W. of Nicosia, 200 m., 8.12.36, peppered over many acres of flat cultivated land, *E. W. Kennedy* 156; Korno, 330 m., 15.11.37, dry hillsides, *Lady Loch* 14; Cape Elea, 17 m., 21.11.37, growing in profusion on rich red soil, *Lady Loch* 16; Ag. Chrysostomos, 330 m., 1.12.37, dry hillsides, *Lady Loch* 18.

Carex illegitima Cesati in Friedrichsth. Reise, 271 (1838) sec. Kükenthal in Pflanzenr. IV. 20, 459 (1909).

Kyrenia, 360 m., ground below precipice facing north, on limestone, 14.11.1936, *E. W. Kennedy* 120.

This material, determined by E. Nelmes, represents a species new to the flora of Cyprus. The distribution of the species is peculiar. It occurs particularly in islands or on peninsulas and is recorded from the following areas: Lesina, Lissa, Cephalonia, Poros, Attica, Eleusis, Peloponnese, and Makronisi (in the Gulf of Smyrna). Mrs. Kennedy's specimens considerably extend the known eastern range.

LXIV—PEDILANTHUS VERSUS TITHYMALUS.

A. A. BULLOCK.

In the American Journal of Botany, 24, 702-704 (1937), Dr. L. Croizat has pointed out that the valid name for the well-known Euphorbiaceous genus *Pedilanthus* Neck. (1790) is *Tithymalus* Mill. (1754). He mentions the fact that Small (Man. S. E. Fl. 804: 1933) has used the name *Tithymalus* Mill., making one new combination, and that Hara (in Journ. Jap. Bot. 11, 381: 1935) has pointed out that if *Euphorbia* sect. *Tithymalus* is raised to generic rank, the name *Galarhoeus* Haw. (1812) must be adopted for it, on account of the pre-occupation of the name *Tithymalus*. Haworth (Syn. Pl. Succ. 136: 1812) used the new name *Crepidaria* for *Pedilanthus* Neck., but this is merely a later synonym, and need not be considered here.

The data given by Dr. Croizat in his careful study of the question appear to be strictly accurate, but his conclusion that *Pedilanthus* should be replaced by *Tithymalus* is based on failure to appreciate the most important principle underlying the International Rules of Botanical Nomenclature: the first essential in nomenclature is to aim at fixity of names (Art. 4). The importance of this principle is emphasized by the acceptance of the further principle of *nomina*

conservanda (Art. 21), which in exceptional cases overrides the principle of priority of publication. The position regarding future *nomina conservanda* was made clear by the Congress of 1935, which adopted the following proposal by Prof. R. Maire:—"As soon as any well-known generic name is found to be endangered, the case should be at once communicated to the Special Committee concerned" (Proc. Zesde Internat. Bot. Congr. 1, 361 : 1936).

The case of *Pedilanthus* versus *Tithymalus* should accordingly have been submitted to the Special Committee for Phanerogamae and Pteridophyta appointed at Amsterdam (Secretary: M. L. Green, Kew). To make new combinations under *Tithymalus* Mill. for species of *Pedilanthus*, before the question of conservation has been considered, is to prejudge the issue.

Conservation of *Pedilanthus* Neck. is warranted, in the writer's opinion, by the facts stated below for the information of the Special Committee, to which the case will be submitted on the appearance of this article:—

(1) The genus *Pedilanthus* includes about 30 species, natives of Tropical America, with the greatest concentration in Mexico. A few are in cultivation in collections of succulent plants.

(2) The name *Pedilanthus* has been in continuous use from 1790 to 1935; *Tithymalus* Mill., on the other hand, was not adopted by any author* between 1754 and 1933, and Haworth's Syn. Pl. Succ. 136 (1812) is the only publication that has been found between these dates in which it is even cited as a synonym. Small adopted it for a single species in 1933, and its general adoption was advocated by Croizat, as indicated above, in 1937.

(3) The *Index Londinensis* records 19 figures, dealing with 11 species under the name *Pedilanthus* Neck., and none under *Tithymalus* Mill.

(4) The name *Pedilanthus* Neck. is adopted in the following important works (the list is not exhaustive):—Neck. Elem. Bot. 2, 354 (1790); Poiteau in Ann. Mus. Hist. Nat. Par. 19, 388 (1812); Spreng. Syst. 3, 802 (1826); H.B.K. Nov. Gen. et Sp. 2, 63 (1817); Baill. Euphorb. 287 (1858); Griseb. Fl. Brit. W. Ind. 51 (1859); Boiss. in DC. Prodr. 15, pars 2, 4 (1862); Baill. Hist. Pl. 5, 178 (1874); Müll.-Arg. in Mart. Fl. Bras. 11, pars 2, 707 (1874); Benth. et Hook. f. Gen. Pl. 3, 257 (1880); Hemsl. Biol. Centr.-Amer. Bot. 3, 88 (1882); Pax in Engl. et Prantl, Nat. Pflanzenfam. 3, 5, 112 (1896), et op. cit. Nachtr. 195 (1907); Urbina, Cat. Pl. Mex. 312 (1897); Dalla Torre et Harms, Gen. Siphonog. 282 (1901); Pulle, Enum. Vasc. Pl. Surin. 264 (1906); Urb. Symb. Antill. 4, 357 (1910), et op. cit. 8, 375 (1920); Goyena, Fl. Nicarag. 291 (1911); Millsp. in Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. 2, 353 (1913); Small, Fl. S.E. United States, 1350 (1913); Boldingh, Fl. Nederl. W. Ind. 256 (1913); Britton, Fl. Bermuda, 218 (1918); Britton et Millsp. Bahama Fl. 233 (1920); Fawc. et Rendle, Fl. Jamaica, 4, 346 (1920); Standl. in Contrib. U.S. Nat. Herb. 23, 604 (1923); Britton et Wils. Fl.

* Except Miller himself, in the various editions of his Dictionary.

Porto Rico and Virgin Is. 496 (1924); Standl. et Calderon, Fl. Salvador, 135 (1925); Pax et Hoffm. in Engl. et Prantl, Nat. Pflanzenfam. 2 Aufl. 19c, 223 (1931).

LXV—MISCELLANEOUS NOTES.

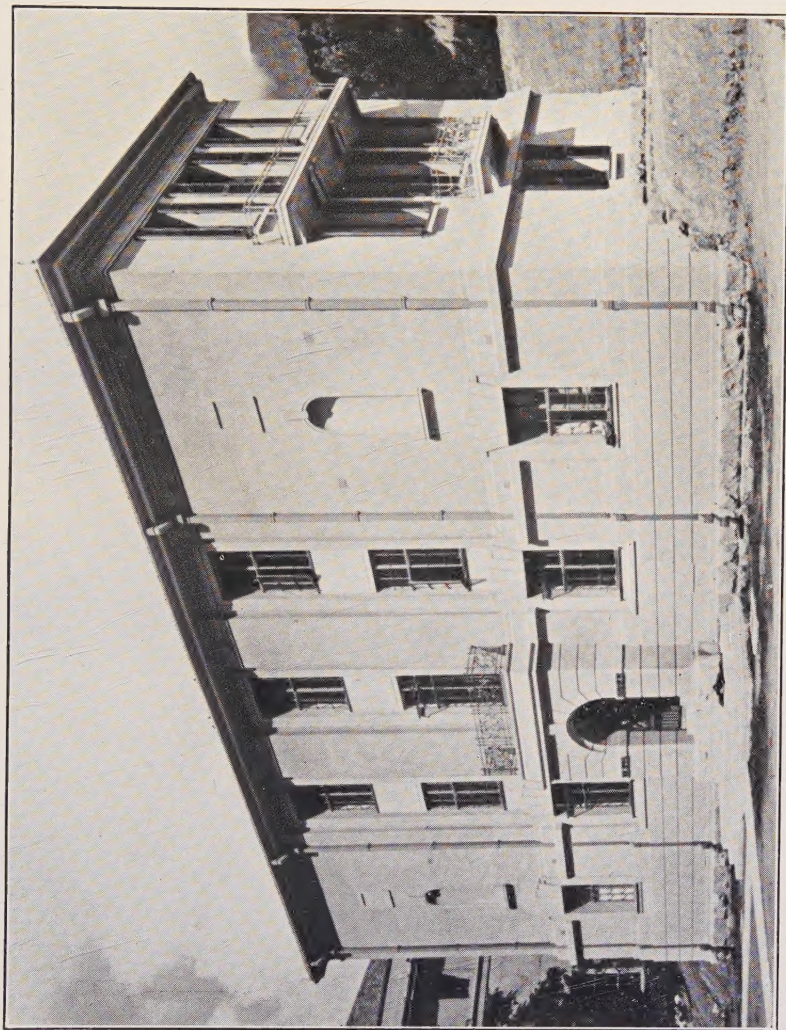
New Building at the University of Cape Town for the Bolus Herbarium.—The Bolus Herbarium was left by the late Dr. Harry Bolus to the University of Cape Town, together with sufficient funds for its continuation as an active force in the botanical life of South Africa. At first it was housed at the Old University buildings in Cape Town, but on the establishment of the National Botanic Garden at Kirstenbosch a special building was erected to house the collection near the garden, with which it has worked in close co-operation.

The unsuitability of the climate at the Kirstenbosch site, however, was unfortunately not realised. In winter the very damp atmospheric conditions at the particular spot occupied by the building proved to be detrimental to the preservation of herbarium specimens, and damp and mould would soon have completely destroyed many of them, particularly succulents. The installation of additional heating apparatus some ten years or so ago has had little effect, and it became imperative that a new site should be found for this valuable collection.

However one may regret the separation of the herbarium from the Botanic Garden, it is a great relief to learn that the herbarium has now been moved to a new building at the University, near Rondebosch, where much drier conditions prevail during the winter, and where it will be available for the use of the University staff.

We are indebted to Dr. L. Bolus, Curator of the Herbarium, for the following details of the fine new building, which have been drawn up by the architect, and for the photograph which is here reproduced.

This building was commenced in November 1937 and completed in six months at a cost of nine thousand pounds. It occupies a sunny and open site at the North West corner of a group of 14 buildings in a formal lay-out on the eastern slope of Devil's Peak. The building is planned long and narrow so as to preserve good natural lighting throughout, and has large steel windows on the East and West sides, but teak windows with louvred shutters on the hot North end. At this end there are balconies for growing plants or drying specimens. The accommodation is arranged on three floors, the lower floor being the Entrance Hall, Workshop and Curator's and Staff Rooms. The two upper floors house the collection of dried specimens and the library, the cases and bookshelves being arranged to form separate spacious and well-lit bays for study and work. The length inside the walls is 77 feet and the breadth 24 feet 6 inches.



The new building of the Bolus Herbarium.

Every care has been taken to keep the building dry. The roof is of heavy Roman pattern tiles laid on boarding and asphalt sheeting; the walls are built with cavities and plastered with water-repellent cement. Fire-resisting materials were used in the construction, and carbon dioxide fire extinguishers are installed.

The architects were Messrs. Walgate & Elsworth, of Cape Town.

Botanical Gardens of the University of British Columbia.—

Professor John Davidson, Associate Professor of Botany in the University, has written an interesting and well-illustrated account of the Gardens which have been developed on ground adjacent to the University buildings.

An area of some five acres on the University site was set aside in 1916 for a Botanic Garden and this has now reached an advanced and very satisfactory stage of development.

The aims of the Gardens at their inception were (1) to assemble a representative collection of plants from all parts of the Province of British Columbia; (2) to grow sets of species belonging to critical genera for study and research, to determine accurately their species and apply their valid names; (3) to create an outdoor museum, to provide living material for teaching purposes as well as for post-graduate research. The latter aim is, of course, a most necessary one seeing that the Gardens are so closely associated with the University.

The Gardens as now organised consist of a Native Garden exclusively devoted to British Columbian plants, which from the wide range of the Province from the coast to high mountains represents a very interesting flora which it is most valuable to have collected together. This portion of the Gardens consists of herbaceous plants, arranged systematically in a series of parallel beds, with the native trees and shrubs planted out on the adjacent lawns. An Exotic Garden has been established mainly for supplying material for teaching purposes and there is also a Medicinal Garden, and a Rock Garden where a number of interesting native plants are being grown.

In the Aquatic Garden a large collection of native water plants is being cultivated, so that in the small space devoted to the Gardens all the essential parts of a Botanic Garden are represented, while the Herbarium is close at hand.

A Botanic Garden in British Columbia dates from the year 1912, when two acres of land were set aside for the purpose on the Provincial Colony Farm, Essondale, but thanks to the establishment of the Botanical Survey of the Province of British Columbia great quantities of material were received at the Provincial Botanical Office and it became necessary, with the inauguration of the University, to transfer the botanical work to the University. In the year 1916, therefore, the collections at Essondale which then numbered 20,000 to 30,000 herbaceous plants, shrubs and trees were transported to the present University site.

The Gardens, situated in so rich a botanical district, are deserving of every encouragement and we offer our best wishes for their success. Five acres is a somewhat small area for so large a collection and it is to be hoped that before long some more ground may be made available for garden purposes and especially for the more extensive display of the native British Columbian flora.

Lithocarpus lappaceus and **L. Falconeri**.—In the Kew Bulletin, No. 3, 1938, pp. 100, 102, these two names appeared as "new combinations," the fact that they had been published previously having been overlooked. The correct citations of these names are :—

Lithocarpus lappaceus (Roxb.) Rehder in Journ. Arn. Arb. **1**, 128 (1919) ; based on *Quercus lappacea* Roxb.

L. Falconeri (Kurz) Rehder, l.c. **10**, 133 (1929) : based on *Quercus Falconeri* Kurz.

The Centenary of the Cell Theory.—We have been asked by the President of the "Sociedad Mexicana de Historia Natural," Apartado Postal 1079, Mexico, D.F., to publish the following announcement :—

"The scientific world celebrates this year the centenary of the cellular theory which was founded by the German botanist Mathias Jacob Schleiden, and by the zoologist Theodor Schwann, a hundred years ago. To commemorate this event, which according to E. B. Wilson, the famous cytologist, has had the same far reaching consequences as the theory of evolution, the Mexican Society of Natural History (Sociedad Mexicana de Historia Natural) resolved at their meeting, May 6th, to publish a special volume which would contain papers relating to problems of the cellular theory and kindred subjects.

"The committee respectfully submits the resolution to the learned sister societies of the world and begs to invite all biologists interested in the cellular theory to collaborate in the preparation of the volume. The paper which, according to the jury, is the outstanding contribution, will be awarded the Schleiden-Schwann medal of the Mexican Society of Natural History. Every cytological paper is welcome, but only those which have a direct bearing on the theory will be judged.

"The committee hopes that the publication of a commemorative volume with contributions by scientists of many countries will not only serve science, but establish also friendly relations with Mexico, where research in biology has found in the last years an enthusiastic support by Government authorities."